



NAVAL  
POSTGRADUATE  
SCHOOL

MONTEREY, CALIFORNIA

**THESIS**

**A QUALITATIVE ASSESSMENT AND ANALYSIS OF  
STAKEHOLDER EXPECTATIONS**

by

Steven G. Bullard

September 2003

Principal Advisor:  
Associate Advisor:

Walter E. Owen  
Bryan Scurry

**Approved for public release; distribution is unlimited.**

THIS PAGE INTENTIONALLY LEFT BLANK

**REPORT DOCUMENTATION PAGE**

Form Approved OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

<b>1. AGENCY USE ONLY (Leave blank)</b>	<b>2. REPORT DATE</b> September 2003	<b>3. REPORT TYPE AND DATES COVERED</b> Master's Thesis
<b>4. TITLE AND SUBTITLE:</b> A Qualitative Assessment and Analysis of Stakeholder Expectations		<b>5. FUNDING NUMBERS</b>
<b>6. AUTHOR(S):</b> Steven G. Bullard		
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000		<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A		<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.		
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited.	<b>12b. DISTRIBUTION CODE</b>	

**13. ABSTRACT (maximum 200 words)**

A Department of Defense acquisition program is influenced by a large number of external stakeholders, including operational users, oversight authorities, contractors and suppliers, and interfacing program managers. Key stakeholders will readily agree that meeting the Warfighting needs of operational users is the primary objective of an acquisition program, however many stakeholders have developed their own strategies to achieve that goal. The job of the program manager within the acquisition system is to deliver a product that best meets stakeholder expectations (the right product delivered the right way). This research defines a methodology for eliciting strategic inputs from key stakeholders associated with an acquisition program. The methodology includes an environmental analysis leading to identification of key stakeholders and focus area for stakeholder interviews. The methodology is applied to the Global Command and Control System-Maritime program to obtain stakeholder input targeted for future strategic plans.

<b>14. SUBJECT TERMS</b> C4I Systems Development, Product Development, Stakeholder Interview, Stakeholder Feedback			<b>15. NUMBER OF PAGES</b> 107
			<b>16. PRICE CODE</b>
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UL

THIS PAGE INTENTIONALLY LEFT BLANK

**Approved for public release; distribution is unlimited.**

**A QUALITATIVE ASSESSMENT AND ANALYSIS OF  
STAKEHOLDER EXPECTATIONS**

Steven G. Bullard

Civilian, PEO-C4I & Space, United States Navy  
B.S., University of California, Berkeley, 1989

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF SCIENCE IN SYSTEMS ENGINEERING MANAGEMENT**

from the

**NAVAL POSTGRADUATE SCHOOL**  
**September 2003**

Author: Steven G. Bullard

Approved by: Walter E. Owen, DPA  
Principal Advisor

Bryan Scurry  
Associate Advisor

Phil DePoy  
Director, Wayne E. Meyer Institute for System Engineering

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

A Department of Defense acquisition program is influenced by a large number of external stakeholders, including operational users, oversight authorities, contractors and suppliers, and interfacing program managers. Key stakeholders will readily agree that meeting the Warfighting needs of operational users is the primary objective of an acquisition program, however many stakeholders have developed their own strategies to achieve that goal. The job of the program manager within the acquisition system is to deliver a product that best meets stakeholder expectations (the right product delivered the right way).

This research defines a methodology for eliciting strategic inputs from key stakeholders associated with an acquisition program. The methodology includes an environmental analysis leading to identification of key stakeholders and focus area for stakeholder interviews. The methodology is applied to the Global Command and Control System-Maritime program to obtain stakeholder input targeted for future strategic plans.

THIS PAGE INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

I.	<b>INTRODUCTION.....</b>	1
A.	BACKGROUND .....	1
B.	PURPOSE.....	4
C.	RESEARCH QUESTIONS .....	4
1.	GCCS-M Research Questions.....	5
2.	Design of Study Research Questions .....	5
D.	BENEFITS OF THE STUDY .....	5
E.	RESEARCH SCOPE AND METHODOLOGY .....	6
F.	ORGANIZATION OF STUDY .....	7
II.	<b>RESEARCH DESIGN AND METHODOLOGY .....</b>	9
A.	INTRODUCTION.....	9
B.	RESEARCH DESIGN FRAMEWORK .....	10
C.	EVALUATION OF ALTERNATIVE RESEARCH STRATEGIES.....	11
1.	Literature Review .....	11
2.	Surveys.....	12
3.	Questionnaires.....	12
4.	Focus Groups.....	13
5.	Interviews.....	13
D.	STAKEHOLDER INTERVIEW DESIGN.....	15
1.	Interviewee Selection Methodology.....	15
2.	Interview Question Design .....	16
3.	Interviewee Indoctrination Brief.....	18
4.	Interview Peer Review and Pre-Testing .....	18
5.	Interview Session Design .....	19
6.	Data Analysis.....	20
a.	<i>Analysis of Closed-End, Scaled Responses.....</i>	21
b.	<i>Analysis of Guided Interview Responses.....</i>	22
E.	CHAPTER SUMMARY.....	23
III.	<b>GCCS-M LITERATURE REVIEW AND ENVIRONMENTAL ANALYSIS....</b>	25
A.	INTRODUCTION.....	25
B.	GCCS-M SYSTEM CAPABILITIES .....	26
C.	GCCS-M STAKEHOLDERS .....	27
1.	Oversight Stakeholders .....	28
a.	<i>Assistant Secretary of Defense for Networks and Information Integration.....</i>	29
b.	<i>Assistant Secretary of the Navy for Research, Development, and Acquisition.....</i>	29
c.	<i>Program Executive Officer for C4I &amp; Space.....</i>	30
d.	<i>Space and Naval Warfare Systems Command.....</i>	31
2.	Fleet Stakeholders.....	32
a.	<i>Chief of Naval Operations .....</i>	33

b.	<i>Commander, U.S. Fleet Forces Command</i> .....	33
c.	<i>Naval Network Warfare Command</i> .....	34
3.	Supplier Stakeholders.....	35
4.	Interface Stakeholders.....	36
C.	GCCS-M NOTEWORTHY EVENTS .....	37
1.	The Beginnings of Navy Command and Control Afloat .....	37
2.	The Beginnings of Navy Command and Control Ashore.....	39
3.	Fleet Initiatives .....	40
a.	<i>Information Technology for the 21st Century (IT-21)</i> .....	40
b.	<i>Task Force Web</i> .....	42
c.	<i>Sea Power 21: FORCEnet</i> .....	43
4.	Statutory and Regulatory Compliance .....	44
a.	<i>MAIS Designation and MAISRC Oversight</i> .....	45
b.	<i>Navy ACAT II to ACAT IAC Transition</i> .....	46
c.	<i>GCCS Family of Systems</i> .....	48
d.	<i>Achieving Statutory and Regulatory Compliance</i> .....	49
5.	Architecture Compliance .....	49
a.	<i>Common Operating Environment</i> .....	50
b.	<i>Future C4I Architecture</i> .....	51
D.	CHAPTER SUMMARY .....	54
IV.	DATA COLLECTION AND ANALYSIS .....	55
A.	INTRODUCTION.....	55
B.	SELECTION OF INTERVIEWEES .....	55
C.	FOCUS AREAS .....	56
D.	RESULTS .....	57
E.	CHAPTER SUMMARY .....	62
V.	CONCLUSION .....	63
A.	SUMMARY .....	63
B.	LESSONS LEARNED .....	64
C.	CONCLUSION .....	65
D.	SUGGESTED TOPICS FOR FUTURE RESEARCH .....	66
	APPENDIX A: INTERVIEW STRUCTURED RESPONSE QUESTIONS.....	69
	APPENDIX B: INTERVIEW INDOCTRINATION BRIEF .....	71
	APPENDIX C: INTERVIEW GUIDED QUESTION RESPONSES .....	73
A.	OPERATIONAL CAPABILITY.....	73
B.	OPERATIONAL SUPPORT .....	75
C.	SHIPBOARD SYSTEMS INTEROPERABILITY .....	77
D.	JOINT/COALITION INTEROPERABILITY .....	79
E.	RETURN ON INVESTMENT .....	79
F.	TECHNOLOGY ADOPTION .....	81
G.	ARCHITECTURE COMPLIANCE .....	83
H.	STATUTORY AND REGULATORY COMPLIANCE .....	84
I.	PROGRAM PLANNING AND RESOURCING .....	84

<b>LIST OF REFERENCES.....</b>	<b>87</b>
<b>INITIAL DISTRIBUTION LIST .....</b>	<b>91</b>

THIS PAGE INTENTIONALLY LEFT BLANK

## LIST OF FIGURES

<b>Figure 1.</b>	<b>Closed-end, Scaled Response Question Design .....</b>	<b>17</b>
<b>Figure 2.</b>	<b>Qualitative Interpretation of Scaled Response Results .....</b>	<b>21</b>
<b>Figure 3.</b>	<b>Presentation of Guided Interview Results .....</b>	<b>22</b>
<b>Figure 4.</b>	<b>GCCS-M Stakeholder Model.....</b>	<b>28</b>
<b>Figure 5.</b>	<b>FORCENet Chain of Command .....</b>	<b>32</b>
<b>Figure 6.</b>	<b>IT-21 Information Architecture .....</b>	<b>41</b>
<b>Figure 7.</b>	<b>FORCENet Capabilities.....</b>	<b>44</b>
<b>Figure 8.</b>	<b>Net Centric Data Strategy .....</b>	<b>53</b>

THIS PAGE INTENTIONALLY LEFT BLANK

## LIST OF TABLES

<b>Table 1</b>	<b>Stakeholder Interviewees.....</b>	<b>55</b>
<b>Table 2</b>	<b>Structured Response Results .....</b>	<b>58</b>
<b>Table 3</b>	<b>Focus Area Statistical Summarization.....</b>	<b>58</b>

THIS PAGE INTENTIONALLY LEFT BLANK

## I. INTRODUCTION

### A. BACKGROUND

Today's acquisition environment is characterized by the involvement of many stakeholders, including executives at the Office of the Secretary of Defense (OSD), Secretary of Navy (SECNAV), Program Executive Office (PEO), Chief of Naval Operations (CNO), Combatant Commands, and Fleet commands (not to mention the men and women who actually utilize military systems). Key stakeholders will readily agree that meeting the mission needs of the Warfighter is the primary objective of an acquisition program, however many stakeholders have developed their own strategies to achieve that objective.

Today, Global Command and Control System-Maritime (GCCS-M) program is at a critical juncture in its acquisition lifecycle. Important issues faced by GCCS-M include:

- GCCS-M is fielded today on over 300 ships and at 100 shore sites. The products in the field must be supported with trouble assists, training, logistics, and documentation. Some submarines are receiving GCCS-M installations for the first time in 2003, while other ships are receiving modernized Commercial Off-The-Shelf (COTS) computer equipment. Corrective, perfective, and adaptive software updates are distributed regularly.
- GCCS-M has been using informal evolutionary acquisition techniques since 1988, however recent 5000 series guidance formalizes the evolutionary acquisition process. Some stakeholders have identified compliance with statutory and regulatory requirements as a high priority.
- During 2004, GCCS-M is conducting its largest Operational Test of new capability since 1998. The program will begin fielding significant, long-awaited enhancements such as PC and web-based capabilities later that year. During 2004 the program needs to refine its technology roadmap and solidify plans for its next release.

- The Chief of Naval Operations resource sponsor is developing a Capability Development Document (CDD) for GCCS-M's next major block using the new Chairman of the Joint Chiefs of Staff guidance on the requirements process (CJCS, 2003). A revised cost estimate, acquisition program baseline, and acquisition strategy will be required to field the capabilities defined in the CDD.
- Service-unique command and control capabilities are being merged into a Joint capability that ensures the service C2 systems are interoperable. The Joint Command and Control architecture is transitioning from a client-server model developed in the early 1990's to an architecture based on network centric enterprise services.
- The program's sole-source development and integration contract is expiring in 2004, and guidance has been provided to competitively award the next contract. The previous contract has been sole sourced for over 15 years. The planned contract award provides an opportunity to incorporate current contracting best practices to improve the effectiveness and efficiency of the acquisition process.
- GCCS-M heavily leverages off the shelf computer hardware and software. The commercial information technology marketplace continues to move at a fast pace, challenging the DOD acquisition process to keep pace as products become obsolete after just months on the market.

There are many alternative courses of action GCCS-M could take in response to the above events. Understanding key stakeholders' expectations is an enabler of the strategic planning process the program must go through to define its future. Each stakeholder views GCCS-M from a perspective that is influenced by job duties, personal experiences with the program, prior and present relationships with individuals in the program office, and historical events. Some stakeholders have responsibilities defined in statute or regulation, as well as the positional authority delegated by a supervisor or senior officer in the reporting chain of command. Even though the individuals who occupy key positions in organizations change periodically, staffers remain behind who provide

corporate memory. The Navy and Joint C4I community is not large; individuals in key decision making positions have been involved with GCCS-M as users, interfacing program managers, and contractors. Relationships are bi-directional. For each stakeholder who has formed perceptions about GCCS-M, the program has formed similar perceptions about the stakeholder that influence how the program acts.

Stakeholder expectations are different than program requirements. For an acquisition program, there is only one official source of requirements: a Joint Requirements Oversight Council (JROC) validated requirements document. The latest Department of Defense (DOD) 5000 guidance (DOD, 2003) establishes evolutionary acquisition as the preferred acquisition strategy and spiral development as the preferred method of implementing evolutionary acquisition. Navy acquisition programs such as GCCS-M that utilize evolutionary acquisition benefit from hands-on Fleet operational usage to guide enhancements and upgrades. Direct operational feedback improves the quality of the product, but it also provides more opportunities for stakeholders to provide input and direction. Under evolutionary acquisition, separating product development from product support is impossible since both occur concurrently and utilize the same financial, infrastructure, and human resources.

DOD systems of all types have struggled to maintain pace with commercial technology. As acquisition reform has unfolded over the past decade, each successive revision to the DOD 5000 series has taken a more proactive, encouraging stance towards the integration of commercial technologies into DOD systems. Commercial technologies have the upside potential to reduce development cost and schedule, but have demonstrated lifecycle cost and supportability challenges that have yet to be fully understood or overcome. DOD has embraced information technology as a key enabler of “net centric warfare”, and as a national asset that can be exploited to achieve an asymmetric advantage over any opponent we might encounter. Adoption of commercial information technology including hardware, operating systems, databases, office productivity, electronic mail, and collaboration tools has been rapid. Stakeholders continue to push the speed of technology adoption from the top as a mechanism for transforming concepts of operation.

The job of the program manager within the acquisition system is to deliver a product that best meets stakeholder expectations (the right product delivered the right way). This research study outlines a formal methodology for eliciting stakeholder expectations, and applies it to the GCCS-M program.

## **B. PURPOSE**

This purpose of this research study is to obtain feedback on the program's performance to date and capture stakeholders' current and future expectations. The GCCS-M Program Management Office has had numerous face-to-face and email discussions with stakeholders, but has never conducted a formal assessment of the program's performance relative to stakeholder expectations. Understanding stakeholder expectations is a critical part of any product development effort. Stakeholders include the end users of a product, but also include the organizations and individuals who finance, authorize, and review product development activities. This research study will establish a methodology for identifying key stakeholders and critical topics of interest that could be applied to other acquisition programs.

The results of this research will be used to improve the program's strategic plan, acquisition strategy, contracting strategy, budget submission, and product development and support processes. Analysis of stakeholder expectations will identify areas where the program needs to improve responsiveness and possibly work to correct stakeholder attitudes that are not wholly accurate.

## **C. RESEARCH QUESTIONS**

The primary purpose of this research is to capture GCCS-M stakeholder expectations. Since the program has never formally gathered stakeholder expectations it is not clear how this should be done. Accordingly, there are two categories of research questions addressed in this study. The first category of questions relates to the specific information the program office wishes to obtain from its stakeholders. The second category of questions relates to identifying an appropriate, repeatable process that can be applied to obtain the desired information.

## **1. GCCS-M Research Questions**

The GCCS-M program would like to incorporate stakeholder assessments and expectations into future plans. The program would like stakeholders to provide inputs that help the program understand its operating environment and desired end states, including answers to the following questions:

1. How do key stakeholders assess GCCS-M's performance in critical focus areas?
2. How could GCCS-M better meet stakeholder expectations in areas that stakeholders are concerned about?
3. How could process, cultural or strategy changes improve the program's performance without new funding?
4. How could the program's priorities be changed to better meet the needs of stakeholders?

## **2. Design of Study Research Questions**

Stakeholder feedback must be focused in areas that the program office can act on, but stakeholders also need to be given sufficient opportunity to express opinions and desires that the program office has not previously identified as being important. The following research questions will be answered during the design of the study:

1. Which stakeholders should be involved in the study?
2. What questions should be asked of stakeholders to ensure that data is actionable and complete?
3. How should stakeholders be approached for their inputs?
4. How will the data collected from the stakeholders be analyzed and presented so that the results can be understood?
5. How can the methodology applied to this research be applied to other acquisition programs?

## **D. BENEFITS OF THE STUDY**

The benefits of this study are two-fold. First, this research will elicit and document GCCS-M stakeholder expectations for use during strategic planning. The

information gathered will be used as an input to improve program technology roadmaps, acquisition management plans, contracting strategy, and requirements documents. Results may also be used to define quantitative performance measures that will provide timelier, more objective measures of program performance. In addition to direct stakeholder feedback, a thorough analysis of the GCCS-M stakeholders and historical event timelines should uncover lessons learned that could be incorporated to improve the efficiency and effectiveness of the program.

Second, this research provides a qualitative research methodology that other acquisition programs lacking clear quantitative performance measures could use to assess performance and identify stakeholder expectations. Although each acquisition program has a different set of stakeholders, needs, and requirements, each program's acquisition is guided by the same Congressional statutes and DOD policies. Each program maintains relationships with Congress, executive branch political appointees, industry, and end users. In the end, every DOD product directly or indirectly provides warfighting utility that can be assessed by its operational users.

## **E. RESEARCH SCOPE AND METHODOLOGY**

This scope of this thesis is focused on the completion of activities required to obtain stakeholder inputs. First, multiple alternatives for performing qualitative research will be evaluated to determine what methods and tools exist. Once appropriate methods have been identified, a process for applying them to the problem of eliciting stakeholder feedback in a DOD acquisition program will be defined. With a defined research process, the next step will be to examine the GCCS-M environment, including an analysis of stakeholder's roles and responsibilities and historic events that influence stakeholder's beliefs about the program. The output of the environmental analysis will be a list of specific stakeholders to be consulted and focus areas and questions that elicit stakeholder input. Using a peer-reviewed, structured, and consistent process, each stakeholder will be approached to obtain feedback. Stakeholder inputs will be formatted to facilitate comparison. Finally, conclusions based on stakeholder feedback will be presented as input into a future GCCS-M strategic plan.

## **F. ORGANIZATION OF STUDY**

This research study is organized into six chapters. Chapter I provides a brief introduction and summary of this thesis. Using a literature review of mixed-method research techniques, Chapter II provides a structured, repeatable process for eliciting inputs from DOD acquisition stakeholders. Chapter III analyzes the GCCS-M program environment, including identification of stakeholders' interests in the program and historical events that have influenced stakeholders' current perceptions of the program. Based on the methodology defined in Chapter II and the environmental analysis of Chapter III, Chapter IV identifies the specific individuals to be consulted, the questions they are to be asked, and the raw data gathered from the stakeholders. Chapter V provides synthesis and analysis of the results, conclusions, lessons learned, and recommendations for further study.

THIS PAGE INTENTIONALLY LEFT BLANK

## **II. RESEARCH DESIGN AND METHODOLOGY**

### **A. INTRODUCTION**

GCCS-M program office staff members have exchanged many written communications with key stakeholders over the past 15 years, as well as holding numerous face-to-face discussions and reviews. These communications have provided guidance and direction shaping the evolution of the program, but they tend to be provided in ways that force the program office to react rather than anticipate. This research is the first time the GCCS-M program office has applied a structured technique to proactively obtain feedback from stakeholders.

Consider the following scenario as one example that illustrates the importance of long-term, proactive planning in the DOD acquisition process. The DOD 5000 series (DOD, 2003a; DOD, 2003b) and the Joint Chiefs of Staff requirements instruction (CJCS, 2003) provide very clear guidance on how requirements should be resourced and managed throughout the acquisition lifecycle. A JROC-validated Capabilities Development Document (CDD) provides the program's definition, and a Program Life Cycle Cost Estimate (PLCCE) identifies the resources required to implement the capabilities in the CDD. The PLCCE is then used as the basis for developing an Acquisition Program Baseline (APB) and serves as the resource input into the DOD Planning, Programming, and Budgeting System (PPBS). The PPBS is built around a six-year planning period that begins two years after the current execution year (CNO, 2003). An acquisition program must have a validated cost estimate at least 2 to 4 years before funding is needed in order to initiate funding through the Program Objective Memorandum (POM). The informal communication process used by GCCS-M and its stakeholders prevents using the planning processes outlined in the DOD 5000 series because inputs are received too late. The result is frequent execution year re-planning and increased compliance oversight from stakeholders at the OSD and DON levels.

Stakeholder inputs that are actionable can be feed into the program's acquisition baseline, updated Capability Development Document, cost estimate, and POM

submission. Since the quality of these documents will be directly related to the quality of the inputs obtained from stakeholders, a formal methodology for eliciting stakeholder expectations is desirable.

## **B. RESEARCH DESIGN FRAMEWORK**

The first step towards finding a practical process for eliciting and analyzing stakeholder inputs is to look at the different general research approaches available. Three research design approaches are identified (Creswell, 2003):

- A quantitative approach is one in which the investigator describes knowledge using techniques such as cause and effect thinking, reduction to specific variables and hypotheses and questions, measurement and observation, and the test of theories. Strategies of inquiry such as experiments and surveys are employed, and the data collected can be analyzed using statistical methods.
- A qualitative approach is one in which the inquirer makes knowledge claims based on constructivist perspectives, such as the multiple meanings of individual experiences. The social and historical contexts of these multiple meanings are analyzed with the intent of developing a theory, pattern, or advocacy perspective. The researcher collects open-ended, emerging data with the primary intent of developing themes from the data.
- A mixed methods approach is one in which the researcher bases knowledge claims on pragmatic grounds (consequence-oriented, problem-centered, and pluralistic). Strategies of inquiry used involve collecting data simultaneously or sequentially to best understand the research problem. The data collection involves gathering of numeric information (e.g. from instruments) as well as text information (e.g. on interviews) so that the final database represents both quantitative and qualitative information.

A mixed methods research design provides the most flexibility to thoroughly answer the GCCS-M research questions. A broad survey of background material must be done before any stakeholders are approached in order to identify the correct stakeholders and define questions whose answers are beneficial to GCCS-M strategic planning. Once

the stakeholders are known and useful questions have been prepared, the stakeholders must be approached in a manner that both ensures their participation and guarantees their inputs are relevant to the concerns of the GCCS-M program. Competing demands for key stakeholder's time necessitate a process that can be completed in 20 minutes. Stakeholders will only be approached once for input, but the concerns facing the GCCS-M program are broad and complex. The data gathering process will need to be rapidly understood by the stakeholder, and the process will need to be structured to maintain focus on key issues.

## C. EVALUATION OF ALTERNATIVE RESEARCH STRATEGIES

The mixed method research design selected for this study provides maximum flexibility for data collection and analysis because both quantitative and qualitative methods can be used. The following research strategies were evaluated for suitability and effectiveness as instruments for obtaining GCCS-M stakeholder feedback.

### 1. Literature Review

First, a preliminary literature review was performed to determine if stakeholder's expectations were clearly and concisely conveyed in existing documentation. Existing literature consisted of either broad DOD and Navy policy guidance or formal program documentation prepared by the program office to satisfy a statutory or regulatory requirement. DOD and Navy policy guidance typically does not help the program manager establish priorities other than "it must be done," or balance conflicting guidance. Many documents are more than two years old, and may not reflect current or future priorities. Other documents define strategic objectives, but are so broad that actionable responses cannot be clearly identified. Archived program documentation such as an Acquisition Plan or Operational Requirements Document typically focuses on addressing statutory and regulatory compliance in accordance with prescribed policy, and as such tends to document facts rather than expectations.

Formal memorandums and presentation materials from reviews and meetings provide a major source of background information and guidance. In the past, programs would archive paper copies of memorandums and briefings in a documentation library for

future reference. In the age of electronic mail and Microsoft PowerPoint slides, routine communications are lost for future analysis unless someone can produce them from a Microsoft Outlook saved messages folder. Fortunately, key GCCS-M electronic mail messages have been printed and placed in the program's acquisition history binders.

Preliminary analysis shows that available documentation provides the historical information necessary to identify stakeholders, identify questions to be asked of stakeholders, and understand the context of stakeholders' comments. The available documentation does not comprehensively and clearly articulate the current and future expectations of GCCS-M stakeholders. When stakeholder intent is clearly stated in documentation, there are sometimes no corresponding quantitative measures to gauge a program's performance towards meeting the intent. Also, the program has experienced situations where the previously stated intent of a stakeholder was met without the stakeholder knowing it. In order to get the information necessary to conduct strategic planning GCCS-M needs to elicit time-current inputs directly from the stakeholders in a participative process.

## **2. Surveys**

Survey techniques were ruled out because GCCS-M's stakeholders form a small, well-defined population. In many cases there is only one knowledgeable individual who understands and can articulate the stakeholder organization's perspective. Furthermore, there is no set of sample data suitable for analysis by statistical methods. Each stakeholder has a different perspective on GCCS-M that must be captured as to understand the complete stakeholder expectation picture.

## **3. Questionnaires**

A questionnaire distributed via electronic mail or posted on a website is another way of eliciting feedback from stakeholders. However there are several disadvantages to research approaches lacking real-time, face-to-face contact. First, there is no opportunity to ask a follow up question without real-time interaction. Since stakeholder input must be clear and actionable to be useful, the researcher must have the opportunity to elicit clarification on incomplete or contradictory statements. Second, response rate to an

email or web-based questionnaire is likely to be below 100% participation. Stakeholders are being targeted because they are known to have relationships with the program tied to specific positional roles and responsibilities. The GAO recommends real-time, face-to-face interviews when a poor response to questionnaires is anticipated (GAO, 1991).

#### **4. Focus Groups**

Focus groups provide face-to-face contact and are time-efficient because feedback from multiple stakeholders can be obtained simultaneously (GAO, 1991). However it would be very difficult to bring all of the stakeholders associated with a DOD acquisition program together in one place. In the DON acquisition process, there is no program event where secretariat level acquisition stakeholders meet with Fleet stakeholders beneath the level of CNO staff. If such a meeting were to be scheduled, program office past experience indicates that principal stakeholders who establish and advocate organizational visions would be inclined to send staff instead of attending themselves. Since representatives of all key GCCS-M stakeholders have never met together there would be significant “forming”, “storming”, and “norming” phases (Tuckman, 1965) required before any useful input was obtained.

#### **5. Interviews**

Qualitative interviews provide an approach for answering the research questions in this study, since interviews ensure the participation of busy stakeholders and provide a forum for asking follow-up questions for clarification.

The qualitative research interview seeks to describe and the meanings of central themes in the life world of the subjects. The main task in interviewing is to understand the meaning of what the interviewees say. Interviews are particularly useful for getting the story behind a participant’s experiences. The interviewer can pursue in-depth information around the topic. (Valenzuela, 2003, p. 2)

This study can leverage an extensive body of prior research on qualitative interviews to identify suitable approaches and methods. Four different approaches have been identified as tools to perform qualitative research interviews (Valenzuela, 2003).

- In an informal, conversational interview, no predetermined questions are asked in order to remain as open and adaptable as possible to the

interviewee's nature and priorities. This approach provides maximum flexibility, but it does not yield structured results that can be readily compared and contrasted. With limited time available for each interview, important topics might not be addressed without applying structure to the interview process.

- The guided interview ensures that the same general areas of information are collected from each interviewee. This approach provides more focus than the conversational interview, but still allows a degree of freedom and adaptability in getting information from the interviewee. This approach also provides structure to manage a short-duration interview and creates groupings of stakeholder inputs that can be compared and contrasted.
- In a standardized, open-ended interview the same open-ended questions are asked of all interviewees. This approach facilitates data analysis and comparison while allowing interviewees the opportunity to explain their answers; however it does not provide flexibility to tailor the interview to the interviewee's specific roles and responsibilities.
- In a closed, fixed-response interview all interviewees are asked the same questions and choose answers from the same set of pre-determined alternatives. This approach ensures uniform answers to questions, but provides no opportunity for the interviewee to explain why an alternative was selected.

A combination of closed, fixed response questions and a guided interview offers the best way to answer the GCCS-M research questions. A series of closed, fixed response questions can be asked early in the interview to identify the issues that are most important to the stakeholder. The interviewer can use these responses to dynamically establish the interview agenda and prioritize the order of further questions. In very short interviews, some lower priority questions might not be addressed before the allotted time is over. The guided interview can be structured around key focus areas that are of concern to the program, such as capability, funding, support, and interoperability. The literature review and environmental analysis in Chapter III examines topics and issues

that have been of interest to stakeholders in the past. During the course of the interview, each stakeholder can be asked for expectations and suggestions for improvement in each focus area. The guided interview approach provides a framework that enables the interviewer to ask follow-up questions if the stakeholder's intent is not clear and actionable. The guided interview approach further facilitates aggregation of stakeholder expectations by focus area.

## **D. STAKEHOLDER INTERVIEW DESIGN**

The interview research design focuses on defining a repeatable process that will ensure relevant, actionable input is obtained from very busy principal stakeholders. This section develops the interview design, and describes planning necessary to ensure the right information is elicited from the right stakeholders. Identification of the specific interviewees and the questions they are to be asked are contained in Part IV of this document.

The GAO uses structured interviews “to audit and evaluate the programs, activities, and financial operations of federal departments and agencies and to make recommendations toward more efficient and effective operations” (GAO, 1991, p.6). The GAO has published its process for conducting structured interviews, and this research will use the GAO’s guidelines as a basis for an interview methodology. The GAO identifies structured interviews as a beneficial method when essentially the same information must be obtained from numerous people. The GAO structured interview process permits open-ended questions if they are presented in a structured, precise manner. Their methodology discourages broad-based, open-ended questions when interviewee’s responses will be compared and contrasted.

### **1. Interviewee Selection Methodology**

The first step towards identifying stakeholders will be to analyze the GCCS-M extended organization through a political lens. The leaders of the organizations that influence the program will be selected as the interviewees. Because GCCS-M and its predecessor systems have been deployed for over 15 years as the Navy’s core command and control capability, there are many senior leaders who have familiarity with GCCS-M.

In addition, GCCS-M is the Navy service component of the GCCS Family of Systems that provides the Joint, integrated command capability to Combatant Commanders. As such, GCCS-M has significant visibility at the Department of Defense level as well as at the Navy level.

Interviews will be scheduled with organization principals rather than staff when possible. It is anticipated that most interviews will be conducted at the GS-15, O-6, or career Senior Executive Service level.

## **2. Interview Question Design**

The GAO identifies three desirable attributes of appropriate interview questions that will be taken into account in the design (GAO, 1991):

- Relevance: Questions should be relevant to the study being conducted and should have a good probability of yielding data needed for the final report. Although this would seem obvious, evaluators sometimes go on “fishing expeditions” and want to include all sorts of variables that can create an unnecessary burden on the interviewee and distract attention from the central purpose of the interview.
- Selection of respondents: Give preliminary consideration to which people can be expected to answer questions. A question may be relevant to a study, but the choice of persons to answer it may be inappropriate.
- Ease of response: Interviews are meant to obtain data that may otherwise not be documented or, if documented, may need some interpretation. This includes opinions and feelings about the study topic. Questions should be relatively easy to answer and should not cause undue burden to the interviewee.

Earlier, a mixed (closed end and guided) interview approach was identified as being appropriate to this research. The first step is to define a standardized closed end question that will be asked in each focus area to determine an initial assessment of the stakeholder’s priorities and interests. The GAO identifies several types of questions for use in structured interviews, including fill-in-the-blank, binary-choice, and scaled-

response (GAO, 1991). A scaled response question will be asked to determine the stakeholder's assessment of GCCS-M performance in each focus area. Pre-defined cues of "excellent", "good", "fair", and "poor" will be used to generate a quantitative assessment of current program performance in each focus area. Some focus areas will be of interest to all stakeholders, but others will be of more interest to stakeholders with specific responsibilities. For this reason, the questionnaire will include a category called "no basis to rate". Interviewees deliberately will not be asked to rank-order the specific focus areas for importance because all are assumed to be important and necessary since they are derived from the environment analysis.

The following figure summarizes the structure of the closed-end, scaled response question that will be asked for each focus area at the beginning of the interview.

Circle the rating that best describes GCCS-M's current performance in each area.					
Focus Area 1	Excellent	Good	Fair	Poor	No Basis to Rate
Focus Area 2	Excellent	Good	Fair	Poor	No Basis to Rate
...	...	...	...	...	...
Focus Area n	Excellent	Good	Fair	Poor	No Basis to Rate

**Figure 1. Closed-end, Scaled Response Question Design**

The next step is to design a question that will cause stakeholders to offer specific recommendations for improvement in GCCS-M. Since inputs are to be used for strategic planning, the question must be focused to elicit strategic goals and expectations rather than tactical inputs associated with current, short-term issues the stakeholder is facing. The GAO offers the following example of how a broad, open-ended question can be re-phrased as a focused question to provide a structured response (GAO, 1991, p.24):

- Broad Question: “What happened to you while you were unemployed?”
- Focused Question: “How did you manage to pay your bills when you were unemployed?”

Using this example of a focused question as a guide, the question to be asked of each GCCS-M stakeholder is “What should GCCS-M do differently in the future to achieve or maintain an “Excellent” rating?” This focused question statement forces the interviewee to associate the response with specific actionable changes that are future focused, and forces the interviewee to address what they dislike about the status quo. When necessary, the interviewer will ask probing questions to encourage the interviewee to offer open and honest opinions and to clarify intent.

### **3. Interviewee Indoctrination Brief**

The GAO emphasizes that informed consent is a critical component to the willingness of an interviewee to participate (GAO, 1991). The GAO suggests discussing the types of questions to be asked and how the answers will be used when interviewees are first contacted, and again when meeting for the interview.

A short indoctrination brief will be prepared to let the interviewees know why the interview is being conducted, and how the information will be used. Because some interviews may last at little as 20 minutes, the target length of the indoctrination brief is under two minutes. The interviewee will be told that the information gathered during the interview has two purposes. First, the interview will obtain stakeholder inputs on the program’s performance that can be used in future strategic planning. Second, data collected during the interviews will be analyzed and reported as part of this thesis. Interviewees will be informed that this research will be archived for public access by the Naval Postgraduate School (NPS) and the Defense Technical Information Center (DTIC). The interviewee will be told which other stakeholders are being approached for interviews. Finally, the interview methodology will be outlined at a high level.

### **4. Interview Peer Review and Pre-Testing**

The GAO recommends expert review and pre-testing of the interview questions to ensure (GAO, 1991):

- The right questions are being asked to obtain the needed information.
- The contents of the question are relevant to the respondent, and the respondent has the information necessary to answer the questions.
- The wording and procedures used in conducting the interview are adequate to ensure valid and relevant results.

The interview methodology, proposed stakeholders, indoctrination brief, and questions will be peer reviewed by no less than three knowledgeable personnel from the GCCS-M program office and PEO-C4I staff. The comments of these reviewers will be incorporated into the final interview methodology and questions. The reviewers will review the indoctrination brief, validate the focus areas, assess the quantitative ranking methodology, evaluate whether more targeted questions would be necessary to elicit constructive feedback, and evaluate the assessment methodology. At least one dry run interview will be conducted for the interviewer to rehearse and to ensure the interview questions will elicit quality feedback in a short amount of time.

## **5. Interview Session Design**

Appointments with members of the Senior Executive Service and other critical stakeholders can be hard to schedule due to travel, high demand for an individual's time, and emergent issues that cause reschedules. Flexibility will be required to accommodate last minute changes. Interviews that require travel will be scheduled during a multiple day trip to accommodate rescheduling. Interviews will be scheduled for 20 to 30 minute periods; however stakeholder schedule fluctuations sometimes result in appointments shorter than that. The objective of the interview session design will be to derive usable input from a 20-minute interview. Some stakeholders may be able to commit additional time that will ensure all of the focus areas are covered and allows additional probing questions to be asked.

There are several alternatives for capturing data during the interview. One approach is to have the interviewer take notes, however this is not preferred because the interviewer can become more focused on note-keeping than on the interview. The

methodology for this interview permits the interviewer to ask follow-up questions, making it very difficult for the interviewer to simultaneously act as the recorder.

A second approach is to have a third party recorder take notes during the interview. The GCCS-M program office has a number of support contractors who are experienced meeting recorders. Support contractors are also located in geographic areas where the interviewees are based. Having a designated recorder permits the interviewer to focus on eliciting information from the stakeholder, but it is possible the recorder will not be able to maintain accurate notes if the interview is fast-paced. Two recorders can work independently and merge their results to mitigate this risk. Notes taken can be reviewed immediately after the interview to fill in any missing information.

A third method is to record the interview using a voice recorder and then transcribe the interview into text. A recorded interview ensures the exact words and aural cues of the interviewee are captured, however there is a risk that the recording device might malfunction. The recorder should be checked several times during the interview to mitigate the risk of data loss.

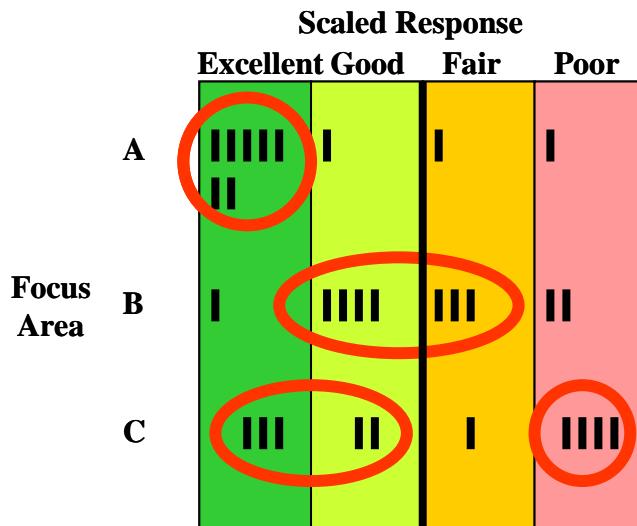
Recording the interview on a voice recorder is the preferred alternative because it provides an accurate, permanent artifact that can be recalled for future strategic planning requirements. However, some stakeholders might not be comfortable with use of a recording device, and some interviews may occur in a government facility that restricts the use of recording devices. A third-party recorder will be present at each scheduled interview in case the stakeholder does not want the interview recorded. If the recorder is used, the recorder and the interviewer will review the interview notes immediately after its completion to improve accuracy and completeness.

## **6. Data Analysis**

The design of the closed-end, scaled response questions and focused, guided response questions provides a natural structure for assembling and communicating the data gathered in the interviews.

*a. Analysis of Closed-End, Scaled Responses*

The qualitative comments and recommendations provided by the GCCS-M stakeholders are expected to provide inputs into the strategic planning process, but a secondary output of the quantitative assessments will be to determine the variability in how stakeholders view GCCS-M. Although sample sets are too small to utilize quantitative statistical methods, the closed-end, scaled responses can be used to compare and contrast stakeholder perceptions about the program in each focus area. Comparing how each stakeholder scores a given focus area can help the program learn if there is agreement on the program's performance, or if certain stakeholders may have a different understanding of the GCCS-M environment than others. Also, an analysis of focus area ranking relative to stakeholder responsibilities could help the program office understand overlaps and boundaries between stakeholder organizations. Figure 2 shows examples of distributions that could result from tabulating stakeholder responses to the closed-end, scaled response questions.



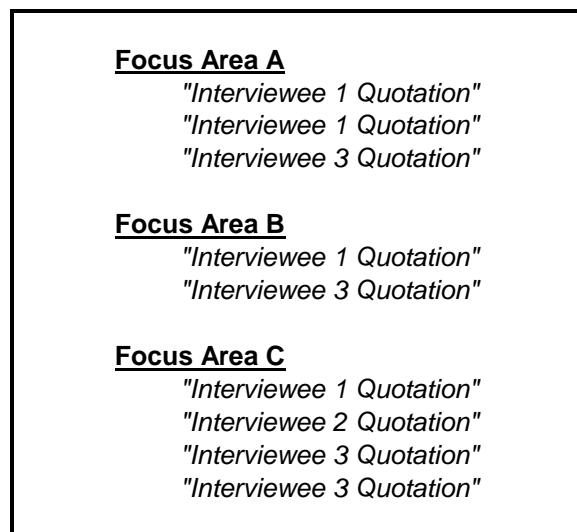
**Figure 2. Qualitative Interpretation of Scaled Response Results**

In this example, the rankings in Focus Area A show a visible dominance towards “excellent” category. It also shows that one or two individuals have a very different point of view than the rest. It is important for the program manager to know why the outliers have evaluated GCCS-M differently. Sample Focus Area B shows a situation where most of the stakeholder’s evaluate the program’s performance as “good”

or "fair". Focus Area C shows rankings distributed across the four categories, demonstrating a situation where there is a lot of variability in stakeholder sentiments. Because of the limited data sample set more rigorous statistical techniques are not appropriate. A qualitative evaluation of the closed-end, scaled responses using the process described above provides sufficient information for the program office to proceed with strategic planning.

***b. Analysis of Guided Interview Responses***

Responses to the guided interview are anticipated to be the most beneficial stakeholder feedback because results are intended to be actionable. The focus area-based structure of the interview will be retained for the presentation and analysis of interview results. Grouping interviewee responses by focus area will enable the program to compare and contrast feedback. The presentation format will be as shown in the following figure:



**Figure 3. Presentation of Guided Interview Results**

This methodology will identify when there is consensus among stakeholder expectations, and may possibly identify focus areas where stakeholders have conflicting expectations.

## **E. CHAPTER SUMMARY**

The first phase of this research has defined a repeatable process for eliciting stakeholder expectations. This process ensures participation of stakeholders, yet is sensitive to demands on their time. The mixed-method research design permits multiple techniques to be applied, including literature reviews, closed-form interviews, and guided interviews. A preliminary literature review reveals that there is substantial background information available that can be used to identify stakeholders and interview questions. The chosen interview research methodology leverages lessons learned and recommended approaches from the GAO's structured interview process. The GAO's interview process has been peer reviewed and applied extensively to obtain input structured inputs from interviewees. Processes for peer reviewing and testing the interview technique, preparing an indoctrination brief, and conducting the interview have been established. Finally, an approach for presenting and analyzing the information gathered from the stakeholders during the interview has been established.

THIS PAGE INTENTIONALLY LEFT BLANK

### **III. GCCS-M LITERATURE REVIEW AND ENVIRONMENTAL ANALYSIS**

#### **A. INTRODUCTION**

The first step in the process of identifying and evaluating stakeholder expectations is to understand the environment GCCS-M operates in. Although DOD 5000 (DOD, 2003a, DOD 2003b) just recently identified evolutionary acquisition as the preferred acquisition strategy for a DOD system, the GCCS-M program and its predecessors have been using informal evolutionary acquisition for more than 15 years to develop and field the Navy's core Command and Control capability. Put another way, GCCS-M has been in concurrent development, fielding, and sustainment for over 15 years.

Over this period, many of today's stakeholders have had prior involvement with GCCS-M, possibly as a shipboard operator of the system, a more junior level manager or acquisition executive, or as an observer looking into GCCS-M from another organization. At the same time GCCS-M was evolving through the acquisition process, key stakeholder roles and responsibilities evolved in parallel with organizational policy and structure change within the DOD and Navy. Each stakeholder's statutory, regulatory, and organizational roles and responsibilities influence his or her concerns, motives, and expected outcomes. The program office has had many noteworthy interactions with its stakeholders over the past 15 years that continue to impact perceptions about the program. Different stakeholders have exerted varying degrees of influence over the program at a given time, but at almost all times there has been at least one significant external force driving the actions and reactions of the program manager. A thorough review of program documentation, memorandums, acquisition decision memoranda, and other available records dating back to the beginnings of the program is necessary to understand the program's current position from each stakeholder's perspective. Fortunately, a large amount of the documentation required to perform this analysis is archived in the program's acquisition library.

The environmental analysis will contribute to this research in two ways. First, the GCCS-M environment will be used to identify which stakeholders should be interviewed,

and what questions they should be asked. Secondly, after the interviews are conducted the environment analysis will be used to understand the context of each stakeholder's assessments and expectations given organizational roles and responsibilities.

## **B. GCCS-M SYSTEM CAPABILITIES**

GCCS-M is the core Command and Control component of the Navy's Command, Control, Communications, Computers and Intelligence (C4I) systems. The system supplies information that aids Navy Commanders in a full range of tactical decisions. In functional terms, GCCS-M fuses, correlates, filters, and maintains raw data and displays image-building information as a tactical picture. Specifically, the system displays location of air, sea, and land units anywhere in the world and identifies whether those units represent friendly, neutral or enemy forces. It operates in near real-time and constantly updates unit positions and other situational awareness data. GCCS-M also records the data in appropriate databases, and maintains a history of the changes to those records. The user can then use the data individually or in concert with other data to construct relevant tactical pictures, using maps, charts, map overlays, topography, oceanographic, meteorological, imagery and all-source intelligence information all coordinated into what is known as a Common Operational Picture. The picture is referred to as common because once constructed it can be shared with other Joint, Coalition, and Allied users who need the information. This information allows commanders to review and evaluate the general tactical situation, determine and plan actions and operations, direct forces, synchronize tactical operations, and integrate force maneuver with firepower. The system operates in a variety of environments and supports command and control of joint, coalition, and allied forces.

GCCS-M is fielded today on 276 U. S. Navy ships, at 88 command centers and shore-based operational sites, 20 P-3 Tactical Support Centers, and 13 mobile command centers. In addition the program has multiple Foreign Military Sales and collaborative international programs with allied and coalition partners who are using the capabilities of GCCS-M. Because more operational sites are added each year and new capabilities are always in development, the program never achieves a traditional Full Operational Capability. Since 1989, GCCS-M has been fielded on Commercial Off-the-Shelf

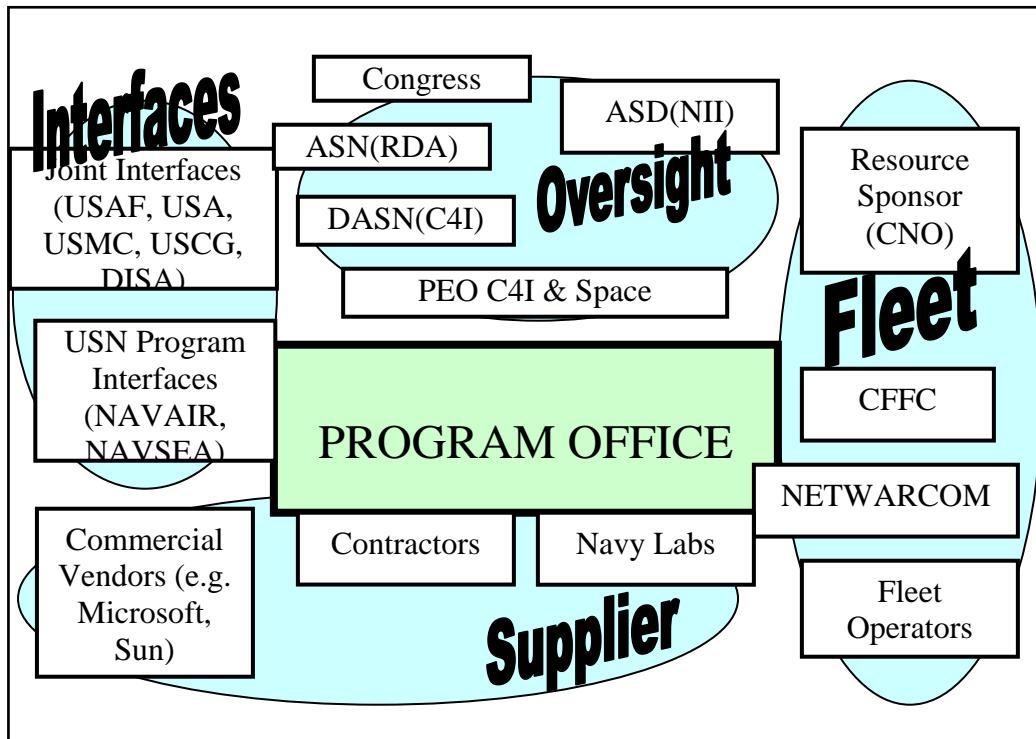
(COTS) hardware purchased from Sun Microsystems or Hewlett Packard. GCCS-M was one of the earliest widely fielded software intensive systems, and as such has been at the forefront of resolving COTS supportability, lifecycle, and maintenance issues.

### C. GCCS-M STAKEHOLDERS

The GCCS-M stakeholders are the individuals and groups who contribute important resources to the organization. A first step towards understanding how GCCS-M stakeholders influence the program is to acknowledge the concept of shared power.

Power is shared in organizations; and it is shared out of necessity more than out of concern for principles of organizational development or participatory democracy. Power is shared because no one person controls all of the desired activities in the organization. (Ancona, 1999, M-2 p. 40)

Sharing power is a necessary part of any complex organization such as an acquisition program. Frequently power must not only be shared, but there is a continuous struggle for power and control among individuals and groups with highly varied interests, goals, and motivations (Ancona, 1999). Common sense assumes organizational leaders will make strategic, rational, and timely decisions in pursuit of the greater good for the Warfighter. Unfortunately, in complex organizations key leaders with different organizational roles and responsibilities may not share the same goals and motivations. This could result in conflicting actions and duplicative efforts. The political perspective views a complex organization through the relationships between stakeholders. One way of modeling the political perspective across an organization is to create a stakeholder model, as is shown in the following figure for the GCCS-M program:



**Figure 4. GCCS-M Stakeholder Model**

The GCCS-M Stakeholder Model identifies four categories of stakeholders that influence the program: Oversight, Fleet, Supplier, and Interfaces. Analysis of interfaces internal to the program office will not be considered within the scope of this research.

### 1. Oversight Stakeholders

GCCS-M oversight stakeholders include senior DOD and DON executives who have statutory and regulatory oversight responsibilities, such as the Program Executive Officer for Command, Control, Communications, Computers, Intelligence, and Space (PEO-C4I & Space), the Office of the Assistant Secretary of the Navy for Research and Development (ASN(RDA)), and the Office of the Assistant Secretary of Defense for Network and Information Integration (ASD(NII)). Prior to 2003, ASD(NII) was known as the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C3I)).

*a. Assistant Secretary of Defense for Networks and Information Integration*

ASD (NII) is the principal Office of the Secretary of Defense (OSD) staff assistant for the development, oversight, and integration of DOD policies and programs relating to the strategy of information superiority for the Department of Defense. ASD(NII) functions include information policy and information management, command and control, communications, counterintelligence, security, information assurance, information operations, space systems and space policy, intelligence, surveillance and reconnaissance, and intelligence-related activities conducted by the Department. In addition, ASD(NII) serves as the Chief Information Officer (CIO) of the Department of Defense (ASD(NII), 2003).

GCCS-M is the designated Navy participant in the GCCS Family of Systems, which is comprised of GCCS-Joint and Air Force, Navy, and Army service GCCS programs. The Office of the Assistant Secretary of Defense (Networks and Information Integration) (OASD(NII)) chairs the Command, Control, Communications, Intelligence, Surveillance, and Reconnaissance (C3ISR) Overarching Integrated Product Team (OIPT) and provides oversight of the GCCS Family of Systems programs. ASD(NII) has signed several Acquisition Decision Memorandums directed at GCCS-M, even though the Milestone Decision Authority is ASN(RDA). The program conducts a yearly program review with the C3ISR OIPT to ensure compliance with statutory, regulatory, and architecture requirements and submits quarterly Defense Acquisition Executive Summary (DAES) reports for OASD(NII) review. The primary GCCS-M interface to the OASD(NII) is through the Army colonel assigned to the Family of Systems programs by the OIPT chair.

*b. Assistant Secretary of the Navy for Research, Development, and Acquisition*

ASN(RDA) is the Service Acquisition Executive within the Department of the Navy, and as such has the responsibilities granted to that position by the DOD 5000 series (DOD, 2003a; DOD 2003b). In summary, ASN(RDA) supervises the performance of the Defense Acquisition System within the Navy, and represents the DON before the Under Secretary of Defense for Acquisition, Technology, and Logistics USD(ATL) and

Congress on all matters related to acquisition policy and programs (SECNAV, 1995). ASN(RDA) is also the Navy Senior Procurement Executive and performs functions related to that role as designated by law, executive order, or regulation. ASN(RDA) serves as the Milestone Decision Authority for all Navy programs, but can delegate that responsibility to a PEO. As an ACAT-IAC program with OSD special interest, the Milestone Decision Authority for GCCS-M is not delegated beyond the Service Acquisition Executive.

Most of GCCS-M's involvement with ASN(RDA) is through the Office of the Deputy Assistant Secretary of the Navy for Research, Development, and Acquisition (Command, Control, Communications, Computers, Intelligence, Electronic Warfare, and Space) (DASN(C4I/EW/SPACE)). The DASN(C4I/EW/SPACE) mission is to be:

The focal point in the Office of the Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN(RDA)) for all matters pertaining to strategic, tactical and non-tactical command and control, communications, computers, intelligence/surveillance/reconnaissance, electronic warfare, space systems, related ancillary and support equipment, Information Resource Management (IRM), Information Technology (IT), and other matters as assigned. (ASN(RDA), 2003, p. 1)

*c. Program Executive Officer for C4I & Space*

As of November 1, 2002, GCCS-M and other acquisition programs at SPAWARSYSCOM were administratively realigned under the newly created PEO-C4I and Space. According to the PEO, Mr. Dennis Bauman, there are three reasons why ASN(RDA) realigned SPAWARSYSCOM programs under a PEO structure:

First, it focuses part of the organization specifically on acquisition, which improves efficiency and effectiveness. Secondly, it increases the interchange among the acquisition professionals at SPAWAR and other acquisition organizations within the Navy and other Services. This is significant because it facilitates a more cohesive joint acquisition community. Lastly, the change clarifies the authorities and reporting structure required by the Goldwater-Nichols Act of 1986 as well as some of the decisions made as a result of the Packard Commission Report of the late 1980s. Goldwater- Nichols and studies like the Packard Commission were part of the genesis and rationale for establishing the PEOs. (CHIPS, 2003)

As an ACAT-IAC program, the Milestone Decision Authority for GCCS-M resides with ASN(RDA) not the PEO. However, the creation of the PEO has engendered an organizational focus on “providing effectiveness and efficiencies in the business of C4I acquisition” (CHIPS, 2003, p. 1) that had not previously existed. The PEO is “empowered to act for and exercise the authority of ASN(RDA) to supervise directly the management of assigned programs, maintaining oversight of cost, schedule, and performance” (SECNAV, 1995, p. 8). A PEO is also responsible for all aspects of life cycle management for its assigned programs. Life cycle management is defined as “all management responsibilities for a program that encompasses acquisition, in-service support, and disposal” (cradle-to-grave support) (SECNAV, 1995, p.3).

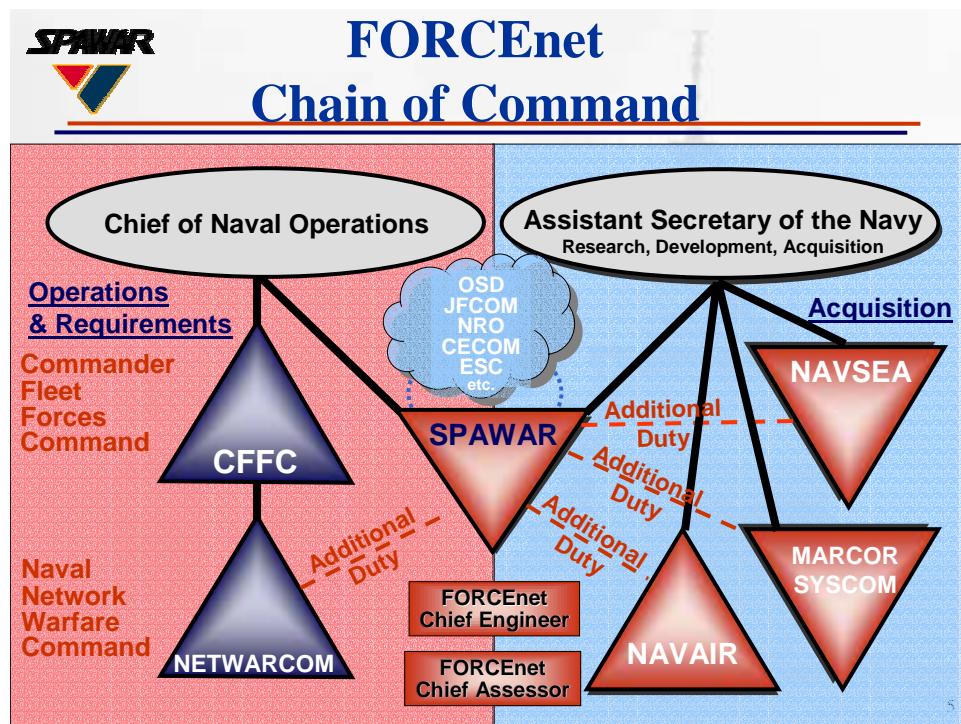
The GCCS-M program office is co-located with PEO-C4I and Space, and has frequent interaction with the PEO and staff. The PEO reviews and approves all acquisition documents before they are forwarded up the acquisition chain of command, and provides technical and financial management guidance across the PEO. The PEO is also the Source Selection Authority for GCCS-M contracts.

*d. Space and Naval Warfare Systems Command*

For most of its history, GCCS-M reported to SPAWARSYSCOM for matters relating to both acquisition and execution year in-service support. As of November 1, 2002, the reporting chain changed such that GCCS-M reports to ASN(RDA) through PEO-C4I for matters relating to acquisition, and to CNO through PEO-C4I and then COMSPAWARSYSCOM in matters relating to execution year in-service support (CHIPS, 2003). SECNAV Instruction 5400.15A defines in-service support as “management and technical support provided between delivery to operational forces and final disposal, including maintenance, technical support, configuration management, and integrated logistics support” (SECNAV, 1995, p. 3).

CNO has also designated SPAWARSYSCOM has also been designated as the C4I Chief Engineer of the Navy and the FORCEnet Chief Engineer (Randall, 2003). The following figure depicts the multiple additional duty relationships that exist as a result of this designation. Reporting through NETWARCOM, SPAWAR is the technical

authority for FORCEnet. As the C4I Chief Engineer of the Navy, SPAWAR reports to the other Navy Systems Commands as the technical authority for C4I architectures.



**Figure 5. FORCEnet Chain of Command (From: Randall, 2003, p. 5)**

GCCS-M relies heavily on its relationship with SPAWAR since approximately half of the civilian and military personnel directly supporting the program office are matrixed from the systems command. All programs under PEO-C4I rely on SPAWAR for comptroller, information technology, legal, contracting, and other support services.

## 2. Fleet Stakeholders

In broadest terms, Fleet customers are the men and women who use GCCS-M operationally across the Navy. The GCCS-M program interacts daily with operational users through Fleet experimentation and demonstration events, operational test, system installation teams, mobile training teams, help desk support, schoolhouse support, deployed ship riders and operational site support teams, and symposiums where Fleet users have the opportunity to discuss GCCS-M directly with the program manager. There are tens of thousands of GCCS-M users at hundreds of commands across the

world. The program does not interface directly with the Fleet for future capability needs and resource prioritization. Instead, this interface is through stakeholders holding organizational responsibilities for requirements and resources. The key stakeholders who represent the GCCS-M operational users include the program's resource sponsor on the Chief of Naval Operations staff, requirements and policy officers at the Naval Network Warfare Command (NETWARCOM), and commanders at the Commander, U. S. Fleet Forces Command (CFFC).

*a. Chief of Naval Operations*

The Office of the Chief of Naval Operations has several key responsibilities in support of acquisition programs (SECNAV, 1995):

- Serve as principal advisors to the Secretary of the Navy in the area of allocation of resources to meet program requirements in the programming and budget processes.
- Coordinate the Test and Evaluation (T&E) Master Plan Process, and provide principal liaison with Commander, Operational Test and Evaluation Forces (COMOPTEFVOR) on operational T&E requirements and execution.
- Identify, validate, and prioritize the warfighting needs, resulting in an approved Initial Capabilities Document (ICD) or Capability Development Document (CDD). Manage the requirements documentation process and liaison with the Joint Requirements Oversight Council.
- Direct the efforts necessary to determine current and future requirements of the Navy for manpower, material, weapons, facilities, and Fleet support including the determination of quantities and military performance requirements.

*b. Commander, U.S. Fleet Forces Command*

The Commander, U.S. Fleet Forces Command (CFFC) was established on October 1, 2001 by the CNO (CNO, 2001). As directed by the CNO and with the goal of furthering Fleet-wide alignment, Commander, Atlantic Fleet, assumed the concurrent duties of CFFC with responsibilities for:

Coordinating, establishing, and implementing integrated requirements and policies for manning, equipping, and training Atlantic and Pacific Fleet units during the Inter-Deployment Training Cycle (IDTC). The integrated policies and requirements coordinated by CFFC will result in standard Fleet-wide practices on both coasts. The purpose of this initiative is to achieve greater unity of effort in fulfilling our Title 10 responsibilities to organize, train, and equip the United States Navy. Alignment is critical to ensuring our Fleet, staffs, systems, and processes deliver a combat-capable Navy ready to sail in harm's way. The result will be a highly unified Fleet that, although deploying from different coasts, draws upon a shared and streamlined organization to complete the same training; executes common tactics, techniques, and procedures; and operates seamlessly around the world. In short, alignment will allow us to more effectively achieve our primary mission: victory in combat. (CNO, 2001, p. 1)

Since CFFC was established, GCCS-M has had multiple program reviews, telephone calls, and electronic mail communications with CFFC senior staff. In the role of Commander, Task Force Web, the CFFC N6 has established Fleet-initiated architectural guidance that acquisition programs are expected to adopt. CFFC is also a high profile user of GCCS-M since GCCS-M supports CFFC's Fleet-wide C2 mission.

*c. Naval Network Warfare Command*

The Naval Network Warfare Command (NETWARCOM) was established on July 11, 2002 to perform three functions (Mayo, 2002):

- In support of Commander, US Fleet Forces Command, organize, train and equip the Navy's ships and Sailors to operate the information network and realize information technology's full capability.
- Support all Fleet commanders in the Navy – Atlantic Fleet, Pacific Fleet, Naval Forces Europe and Naval Forces Central Command – with the day-to-day running of the global information network in support of Naval and Joint Commanders.
- Integrate, assess and deliver the "full requirement" for Navy's information technology, information operations and space requirements.

At the ceremony standing up NETWARCOM, VADM Richard Mayo made the following observations about the role he viewed the new command taking in the future of network-centric warfare:

I will not forget the report of a returning battle group commander earlier this year to the Chief of Naval Operations. He was discussing the overall great success of his Sailors and ships in their deployment to the Indian Ocean in support of the global war on terrorism. He reported the "network-centric warfare worked, but that it was fragile." Changing and improving that assessment, in fact, will clearly be our mission at Naval Network Warfare Command. Today, too many possibilities of single point failures exist; too many non-standard configurations exist. We clearly need to make network-centric warfare capability more robust, especially against a capable adversary, and configured to a common standard. (Mayo, 2002, p. 1)

### **3. Supplier Stakeholders**

Industry stakeholders are the defense contractors and Navy Working Capital Funded (NWCF) research labs that develop, integrate, test, and support the GCCS-M system. Later parts of this paper will explain how GCCS-M evolved from many separate, smaller acquisition programs and projects that provided similar capabilities but were tailored to organizational or functional niches such as command centers, P-3 mission support, or ship scheduling. As these multiple smaller programs and projects were brought into what eventually became GCCS-M, the program office retained the specialized development contracts associated with each niche. In 1998, the program managed development and system integration tasks performed by the following NWCF activates and contractors: SPAWAR System Center San Diego, SPAWAR System Center Charleston, International Research Institute (INRI), PRC, two autonomous groups at SAIC, FGM, PRB, DTAI, Motorola, APC, Autometric, and SEMCOR (NCCS, 1998). In effect, the GCCS-M program office was operating as the program integrator because it utilized an acquisition strategy with widely distributed performers.

By 2003, several major factors had influenced the collapse of this into a more manageable trio of Northrop Grumman and two NWCF activities (SPAWAR Systems Center Charleston and SPAWAR Systems Center San Diego). First, Northrop Grumman bought INRI, PRC, and PRB creating a dominant development contractor for the first time in the program's history. After the buyouts occurred, the GCCS-M program

encouraged Northrop Grumman to consolidate its many GCCS-M activities under a single management team. Second, reprioritization of resources and requirements ended relationships with several other contractors.

When working with industry, it is important to remember its motivations and limitations. The objective of a business is to create value for its shareholders while maintaining a sound financial position (Anthony, 1999). Profit and return on investment are widely accepted measures of value generation for a business. Market share has become another method of measuring a company's performance in the competitive DOD marketplace. Industry stakeholders negotiate contracts with the program office, but lobby Congress and influence political appointees and other key DOD executives on matters related to an acquisition program. In addition to traditional defense contractors like Northrop Grumman, vendors who provide commercial products to the government for purchase, such as Microsoft and Oracle, are becoming increasingly visible on the political scene as the value of COTS purchases increases.

Working with Navy Working Capital Fund activities is similar, although the business objective of NWCF organizations is to generate enough revenue to pay labor and operational costs (maintain a sound financial position) without creating value for shareholders. As with industry, NWCF activities maintain close relationships with Congress particularly when Base Realignment and Closing (BRAC) proceedings are underway. A program manager can choose how much tasking goes to a NWCF activity, but as part of the organizational claimancy that includes the NWCF activities a program is a financial stakeholder. NWCF labor rates can increase if resources are under-utilized.

#### **4. Interface Stakeholders**

GCCS-M has identified approximately 150 other acquisition programs and projects that it has management and engineering relations with. In some cases, these relations simply involve occasional meetings between each program's managers and engineers to discuss areas of common interest. In more than 60 cases a one-way or bi-directional information exchange occurs between GCCS-M and another system driven by a requirement in either program's JROC validated requirements document. Interface stakeholders are systems and capabilities developed by the Fleet, other Navy program

offices, and other services that exchange information with GCCS-M. Several of the interfaces are mission critical, including the interface with the Tactical Tomahawk Weapons Control System (TTWCS). Competition among program managers for scarce financial resources is keen; reuse of existing capabilities is widely recognized by program managers as one way to provide an affordable solution to a mission need.

## C. GCCS-M NOTEWORTHY EVENTS

Having described the roles and responsibilities of the stakeholders involved in GCCS-M acquisition and in-service support, the next step is to describe the experiences and milestones those stakeholders have shared with the program. A review of program events and milestones over the past 15 years provides a basis for understanding the context for how today's key stakeholders view GCCS-M.

### 1. The Beginnings of Navy Command and Control Afloat

The Navy Tactical Command System-Afloat (NTCS-A) Decision Coordinating Paper (CNO, 1991) provides a history of the development of Navy C2 systems prior to 1991. As early as 1971, Tentative Specific Operational Requirement (TSOR) No. 31-42T validated the initial requirement for the creation of Tactical Flag Command Center (TFCC) as a dedicated space in which the Officer in Tactical Command (OTC) and Composite Warfare Commander (CWC) would fulfill their command and control responsibilities. The 1980 TFCC Navy Decision Coordinating Paper (NDCP) provided for the phased development of TFCC. Increment I provided for the design and installation of a dedicated Sensitive Compartmented Information (SCI)-capable space in selected afloat command platforms, including CV-, CVN-, LHA-, and LHD-class ships. Increment II added the Flag Data Display System (FDDS), which provided hardware and software for displays, decision support tools, and data correlation.

On 3 August 1989, the Assistant Secretary of the Navy for Research, Engineering, and Systems (ASN(RE&S)) approved consolidation of TFCC, the Afloat Correlation System (ACS), and the Electronic Warfare Coordination Module (EWCM). The ASN(RE&S) decision memorandum of 17 Aug 1989 directed incremental acquisition using the Joint Logistics Commanders Guidance on Evolutionary Acquisition (EA) as the

strategy for development. The restructured system provides the basis for the NTCS-A baseline configuration, which was planned for installation in thirty-three CN-, CVN-, AGF-, LCC-, LHA-, and LHD-class ships, as well as five shore sites beginning in FY 1990.

Created as a Fleet initiative, the Joint Operational Tactical System (JOTS) provided a downsized tactical information transfer, display, and decision-aiding system. Under sponsorship of CINCLANTFLT, the Fleet CINCs prototyped JOTS using the Commercial Off-the-Shelf Navy Standard Desktop Tactical-Support Computer (DTC-1) to address deficiencies in processed wide area surveillance information, tactical decision aids, and C2 display functions not already being met by afloat and ashore C2 systems. Following transfer of development responsibilities to the Space and Naval Warfare Systems Command (SPAWAR), JOTS was converted to the DTC-2 COTS hardware using the UNIX operating system. This aligned JOTS and NTCS-A on the same hardware and software operating environment baseline and JOTS was incorporated into NTCS-A. The JOTS inventory objective included 255 cruisers, destroyers, frigates, auxiliaries, and amphibious ships. These platforms combined with the 33 previously identified platforms comprise the NTCS-A inventory objective that remains today for GCCS-M afloat (along with the addition of submarines).

The NTCS-A evolutionary development strategy implemented required capabilities by reusing designs and technology previously developed for TFCC, ACS, EWCM, and other stand-alone systems such as the Prototype Ocean Surveillance Terminal (POST). This approach integrated TFCC elements with other C4I systems and workstations to achieve a consolidated, interoperable architecture. Continued rapid prototyping facilitated the infusion of enhanced capabilities to the baseline. Implementation of NTCS-A included a standardized human-machine interface, distributed access to databases, and on-going evaluation and development of additional capabilities in a systematic manner oriented toward expedient delivery of capabilities to the Fleet. This rapid deployment was to be achieved through innovative acquisition streamlining with planned incremental upgrades to the operational baseline system emphasizing the use of non-developmental item (NDI) and COTS hardware and software applications. No ACAT designation letter can be found in the program's acquisition

documentation library, however subsequent program documentation states that NTCS-A had been designated as an ACAT II program by ASN(RDA). (CNO, 1991)

## **2. The Beginnings of Navy Command and Control Ashore**

At approximately the same time as NTCS-A and its predecessors were being developed, the Operations Support System (OSS) was developed as an integrated C2 information management system to meet the command center support requirements of CNO and the Fleet Commanders-in-Chief (SPAWARSYSCOM, 1993). OSS provided CNO and the Fleet Commanders-in-Chief with a single C2 system to receive, process, display, maintain, and assess unit characteristics, employment scheduling, materiel condition, combat readiness, Warfighting capabilities, and positional information. As with NTCS-A, OSS was developed using the guidance of the Joint Logistics Commanders Guidance on Evolutionary Acquisition as the strategy for development. Because OSS was the first program to utilize this guidance, it was initially elevated from an ACAT III to an ACAT II program. However, upon fielding an initial block of capability in 1992 it was reverted back to an ACAT III status because it did not meet ACAT II funding thresholds. OSS was developed to utilize the same COTS hardware and software platform as NTCS-A, thereby leveraging a common architecture and hardware procurement contract. This observation led to the combination of NTCS-A and OSS into the Joint Maritime Command Information System (JMCIS).

Similar to CINCLANTFLT's involvement in the development of JOTS, CINCPACFLT guided requirements definition, development, and fielding of OSS. Fleet commanders at CINCLANTFLT and CINCPACFLT became personally involved in the development of the C2 capabilities necessary to conduct operations, ensuring that these systems had significant operational utility and relevance. An extreme indicator of the personal attention paid to these early Navy C2 systems is the "coincidence" that JOTS carries the initials of VADM Jerry O. Tuttle, who developed the initial JOTS capability at CINCLANTFLT. VADM Tuttle served as the CNO resource sponsor for both NTCS-A and OSS at the time the 1991 coordination paper (CNO, 1991) was written.

From their inception, GCCS-M and its predecessor systems have been at the leading edge of acquisition reform. Non-Developmental and COTS hardware and

software were adopted long before these terms were widely used within the acquisition community. Evolutionary acquisition was used by GCCS-M for more than a decade before it was formally defined by DOD and identified as the preferred acquisition strategy (DOD, 2003).

### **3. Fleet Initiatives**

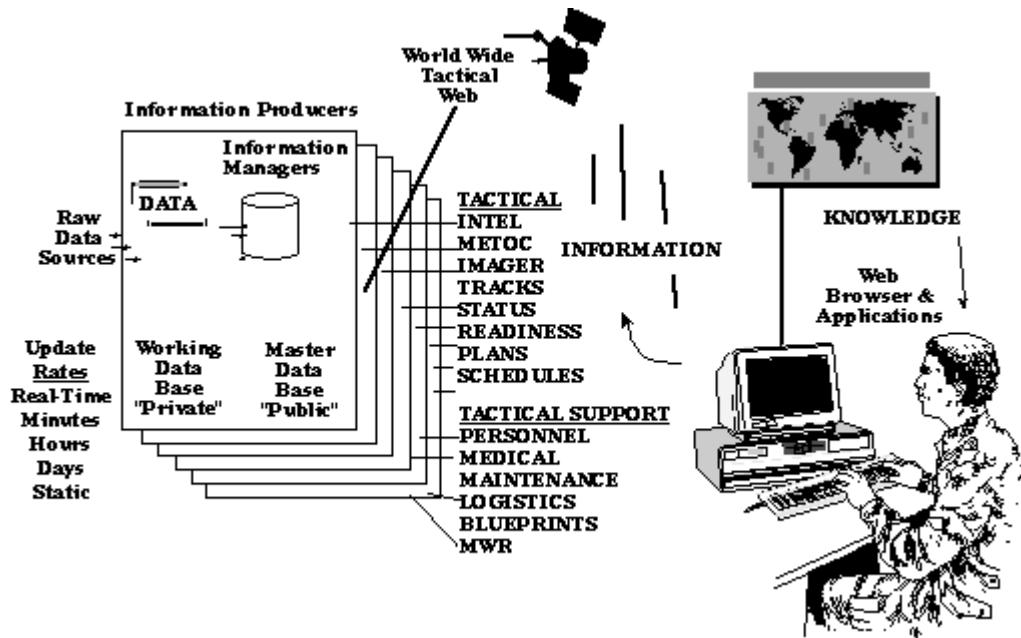
During the course of GCCS-M development, several other Fleet initiatives like JOTS have influenced the technical architecture of the program. Examples of widely known Fleet-sponsored initiatives include IT-21, Task Force Web, and FORCEnet. Although these initiatives improve the usability and capability of GCCS-M, they are started and often finished before the program ORD is updated through the JROC requirements process. Initiatives are initially funded through execution year re-prioritization instead of the PPBS process, and scheduled for completion before a cost analysis can be performed and an update of the Acquisition Program Baseline can be approved by the Milestone Decision Authority. The result of re-prioritization is that capabilities planned through the official requirements process and installations planned through the PPBS process are deferred.

#### ***a. Information Technology for the 21st Century (IT-21)***

As with JOTS and OSS, Information Technology for the 21<sup>st</sup> Century (IT-21) was initiated and guided by the Fleet. The vision for IT-21 was first articulated in January, 1997 by ADM Archie Clemmings while serving as Commander in Chief, U.S. Pacific Fleet:

The goal of IT-21 is to link all U.S. forces and eventually even our allies together in a network that enables voice, video and data transmissions from a single desktop PC, allowing warfighters to exchange information that is classified or unclassified, and tactical or non-tactical. To do this, we must build a system to industry standards, using commercial off-the-shelf technology, devoid of stovepipes, in a client-server environment that allows the pull of just what information is needed in a way that's seamless to the user in the field. (Clemmings, 1997, p. 1)

Although now 6 ½ years old and many underlying technologies have changed, the top level information architecture concept for how IT-21 was to enable net centric warfare remains valid, as depicted in the following figure:



**Figure 6. IT-21 Information Architecture (From: Cleminns, 1997, p. 1)**

Since JMCIS and its predecessor systems were already fielded on every Navy ship, the JMCIS program immediately became the mechanism for purchasing and installing the computers and network equipment required to implement the IT-21 vision. First generation personal computer and web-based C2 capabilities were delivered for Operational Test in January, 1998 (a year after ADM Cleminns announced IT-21). These personal computer and web-based capabilities were fielded with the JMCIS 98 software version that was later renamed to GCCS-M 3.1.

In June 1998, following successful completion of the JMCIS 98/GCCS-M 3.1 operational test, the program office was split by COMSPAWARSCOM into two separate program offices. The Navy Command and Control Systems program office remained focused on applications (including GCCS-M), and another program was established to focus on shipboard local area networks and general usage personal computers. Since networks were previously part of GCCS-M funding and ORD requirements, this essentially descoped the program and created a critical programmatic interface between applications and networks that remains to this day.

Migration towards the personal computer platform remains a major focus of GCCS-M. An Operational Test (OT) of GCCS-M using entirely PC clients will occur in 2004. Migration of server-based capabilities to the PC platform is planned to begin in 2005, however critical capabilities within GCCS-M that are actually funded and developed by the Defense Information Systems Agency (DISA) (the Common Operating Environment (COE)) are not yet available on a Microsoft Windows-based PC. In the meantime, legacy equipment fielded before 2005 will likely be installed and supported for over a decade.

*b. Task Force Web*

The Chief of Naval Operations (CNO) chartered Task Force Web (TF Web) on 3 April 2001 to lead the Navy's web transition effort. Prior to its charter from the CNO, TF Web was established as a Fleet initiative by the Commander in Chief, U. S. Atlantic Fleet. The TF Web five-point mission is to: (Armistead, 2003)

- Establish and maintain an architectural blueprint
- Coordinate IT systems architectures
- Provide recommendations to CNO on web-enablement technologies
- Review Operational Requirements Documents and Mission Needs Statements for web-enablement
- Assist SYSCOM and PEO organizations with prioritizing and migrating existing systems to the TF Web architecture.

TF Web was established to replace and consolidate dozens of websites that were being created throughout the Navy into an environment where "operational and business practices are connected worldwide via interconnected and interoperable web-based IT systems" (Armistead, 2003, p. 10). The method for achieving this is via an enterprise web portal such as provided by Yahoo or the Microsoft Network (MSN). The portal aggregates and categorizes content, can be customized for specific job duties and personalized for individual needs, and provides a common look and feel.

As with IT-21, the GCCS-M program rapidly became a focus of attention of the primary TF Web stakeholder, the Commander, Fleet Forces Command (CFFC) N6. Although GCCS-M had been developing and fielding web-enabled capabilities since 1996, responding to the challenge from CNO and CFFC to integrate with the TF Web portal environment caused significant reprioritization and execution year re-planning. Commander, SPAWARSYSCOM asked GCCS-M and other programs to rally behind the CNO vision in order to demonstrate responsiveness to Fleet needs; however additional requirements were not added to the program's ORD, budgeted through the PPBS process, analyzed for cost impact, or included in the acquisition baseline. The needs of the Fleet moved significantly faster than the acquisition process, however GCCS-M successfully fielded an initial web enabled, portal-compliant capability less than a year after the TF Web initiative was announced.

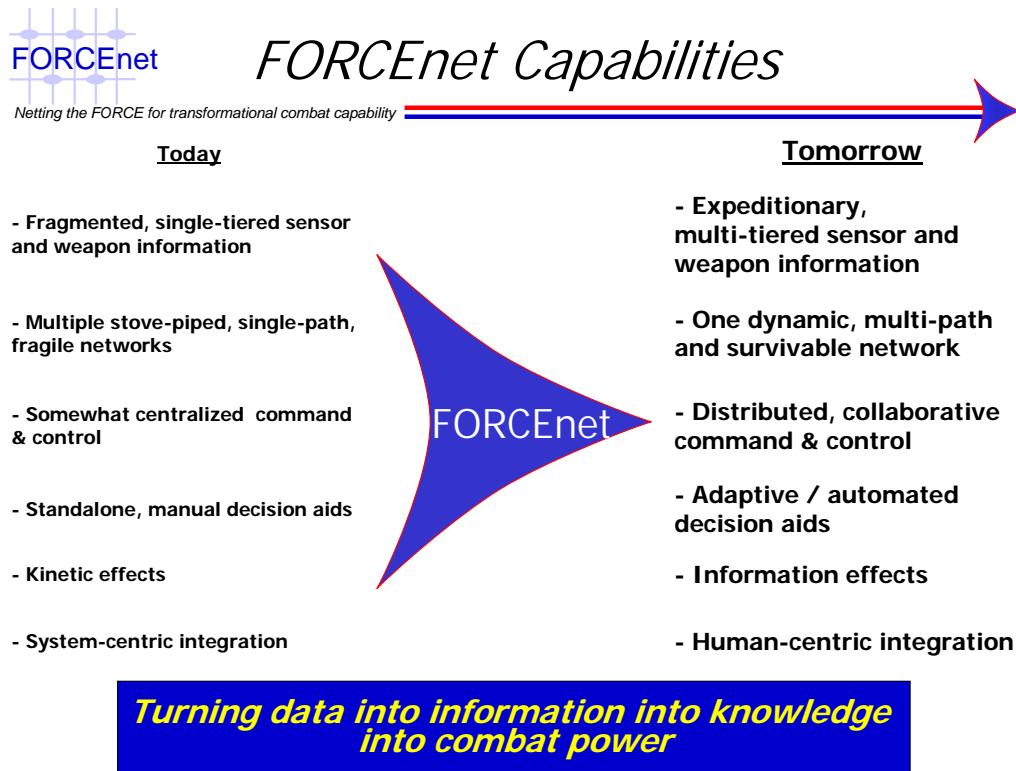
*c. Sea Power 21: FORCEnet*

Admiral Vern Clark, the Chief of Naval Operations, unveiled Sea Power 21 the transformational vision for the United States Navy in 2002. FORCEnet is defined by the CNO Strategic Studies Group as “the operational construct and architectural framework for naval warfare in the information age that integrates warriors, sensors, networks, command and control, platforms, and weapons into a networked, distributed combat force that is scalable across all levels of conflict from seabed to space and sea to land” (Mayo & Nathman, 2003). NETWARCOM is chartered as the fleet agent and lead Type Commander (TYCOM) for FORCEnet (Mayo, 2003).

Developing FORCEnet will involve designing and implementing a network architecture that includes standard joint protocols, common data packaging, seamless interoperability, and strengthened security. It requires identifying and prioritizing capability investments within and across joint, interagency, and international programs. Most importantly, it will emphasize people as the center of FORCEnet development, so that technological advances support increasingly rapid and accurate decision-making.

The goal of FORCEnet is to arm our forces with superior knowledge, leading to increased combat power. In pursuit of this goal, FORCEnet will provide a comprehensive network of sensors, analysis tools, and decision aids to support the full array of naval activities, from combat operations to logistics and personnel development. The focused, timely, and accurate

data delivered by FORCEnet will help leaders at every level by allowing them to draw on vast amounts of information and share the resultant understanding. This will increase the joint force's ability to synchronize activities throughout the battle space to achieve the greatest impact. (Mayo & Nathman, 2003, p. 1)



2

**Figure 7. FORCEnet Capabilities (From: Mayo, 2003, p. 2)**

As with other Fleet initiatives, GCCS-M has embraced FORCEnet to demonstrate responsiveness and has redirected program resources in support of the Sea Trial experimentation process envisioned by CNO in Sea Power 21. Included in this capability are PC-based, web-enabled C2 applications with three-dimensional visualization of the Common Operational Picture.

#### **4. Statutory and Regulatory Compliance**

Although compliance with statutory and regulatory requirements should be straight-forward, for most of its 15-year history GCCS-M's evolutionary acquisition strategy was not officially acknowledged by the DOD 5000 series as a legitimate acquisition approach. With the 2003 version of the 5000 series documents (DOD, 2003a

& DOD, 2003b) the first clear guidance on evolutionary guidance has been established. GCCS-M is currently updating its acquisition strategy to conform to the latest regulatory guidance. Through almost all of its history, GCCS-M has received conflicting guidance on whether it had to follow statutory and regulatory guidance for a Major Automated Information System (MAIS), including compliance with the Clinger-Cohen Act of 1996. Within the past three years, the guidance from OASD(NII) and ASN(RDA) have become clear and unwavering – become compliant.

*a. MAIS Designation and MAISRC Oversight*

As early as 1993, ASD(C3I) designated OSS as an information system requiring the oversight of the Major Automated Information System Review Committee (MAISRC). After a request from CNO to reconsider this decision (CNO, 1993), OASD(C3I) declared that “it seems inappropriate to require additional bureaucratic review by the MAISRC whose members are neither accountable nor responsible for this sound program” (ASD(C3I), 1993). A similar series of events occurred in 1995 when OSS was again added to the MAISRC oversight list, and again a Navy request to remove OSS from MAISRC oversight was successful because OSS did not meet funding thresholds for MAISRC oversight (CNO, 1995). ASD(C3I) did ask for the Navy to brief OSS and JMCIS to the MAISRC for evaluation as part of a broader review of the GCCS-Joint program, and stated that OSS and JMCIS were in fact MAIS programs (ASD(C3I) 1995). In 1996, OASD(C3I) issued a memo stating that MAIS reporting was not required for JMCIS or OSS until such point as ASD(C3I) and the Navy came to agreement on an oversight strategy given that the Navy maintained oversight of the programs (ASD(C3I), 1996). In 1997, the Naval Information Systems Management Center issued a memorandum directing all budget submitting officers that ASD(C3I) had made the determination that “all command and control systems and resources previously exempted from Information Technology (MAIS) budget reporting are no longer exempt and should be reported (CNO, 1997). Yet, in a 1999 memorandum OASD(C3I) identified JMCIS as a non-MAIS special interest program subject to component review not DOD oversight (ASD(C3I), 1999).

Concerns about MAIS designation and MAISRC oversight can be summed up by the following statements from a 1996 memo from Commander, SPAWARSYSCOM:

I believe this will work against our acquisition streamlining initiatives, result in loss of program synergism, and loss of programmatic flexibility of the evolutionary acquisition process. The increased level of oversight as a designated MAIS program will defeat the purpose of evolutionary acquisition (SPAWARSYSCOM, 1996, p. 1).

This argument is consistent with the defensive posture taken by the Navy in its other responses to ASD(C3I) (CNO, 1993; CNO, 1995). The argument was generally accepted by ASD(C3I) until the waning days of the Clinton Administration when Secretary of Defense William Cohen began to enforce compliance with the letter and intent of the law bearing his name, the Clinger-Cohen Act (CCA) of 1996 (CCA, 1996).

*b. Navy ACAT II to ACAT IAC Transition*

On March 24, 1997 the GCCS-M program received a memorandum from ASN(RDA) delegating milestone decision authority for NTCS-A to Commander, SPAWARSYSCOM (ASN(RDA), 1998). The delegation letter does not change the program's designation from its previous designation as an ACAT II. On 1 June 1998, the JMCIS program conducted an ACAT II Milestone IID Review (its fourth MS III under evolutionary acquisition) with its Milestone Decision Authority as Commander, SPAWARSYSCOM (SPAWARSYSCOM, 1998). At this review, the program was directed to change its name from JMCIS to GCCS-M, and to release GCCS-M version 3.1 for Fleet usage. This version of GCCS-M provided initial PC-based capabilities and shipboard local area networks in support of the IT-21 initiative, and provided the program's earliest Y2K compliant release. The Acquisition Decision Memorandum also directed the program to start development of its next release, GCCS-M version 4.X, and stated that the next program review would be a Milestone IIIA.

In early 2001, the PM became aware that GCCS-M was identified in the FY01 Defense Authorization Act as being an ACAT IAC program. OASD(C3I) advised the program manager that GCCS-M would become an ACAT IAC program as soon as ASD(C3I) signed an ACAT designation letter. Concurrently, the Navy Operational Test

and Evaluation Force (OPTEVFOR) completed an Operational Test (OT) of GCCS-M version 3.1.2.1. OPTEVFOR issued a memorandum on 15 March 2001 stating that GCCS-M 3.1.2.1 is “operationally effective and operationally suitable, and recommended for Fleet release” (OPTEVFOR, 2001). Commander, SPAWARSYSCOM was still officially designated as the Milestone Decision Authority and directed the program to convene a MS III review on 22 March 2001 (NCCS, 2001) to obtain his approval for release of GCCS-M 3.1.2.1. A few hours before the review, Commander, SPAWARSYSCOM and DASN(C4I) held a phone call to discuss who had authority to release GCCS-M 3.1.2.1 given that the ACAT II delegation letter had not been revoked. The review proceeded against the wishes of DASN(C4I); however, upon arrival at the review, Commander, SPAWARSYSCOM realized that he wanted a MS IIIE review even though the 1998 ADM had directed that the next review would be a MS IIIA. Ten minutes into the meeting the review was stopped due to Commander, SPAWARSYSCOM’s concerns over his inability to approve a MS IIIA and personal concerns about technical limitations of GCCS-M 3.1.2.1.

The acquisition status of GCCS-M was formally determined on March 30, 2001 when the ASD(C3I) signed a memo designating GCCS-M as an ACAT IAC Major Automated Information System (MAIS). This memorandum further directed GCCS-M to:

Comply with other acquisition management and documentation requirements for MAIS in DOD 5000 series guidance. See particularly new sections ... which implement the Clinger-Cohen Act (CCA) and related statutory requirements (ASD(C3I), 2001, p. 1).

The memorandum did not specify a timeline for compliance. The ASD(C3I) designation letter did not designate a new Milestone Decision Authority, so by default the ACAT IAC designation made the Component Acquisition Executive (CAE) the MDA, who for the Navy is ASN(RDA). During 2001, the ASN(RDA) position was vacant and the Principal Deputy (PDASN(RDA)) was empowered to act as the Milestone Decision Authority. DASN(C4I) performed coordination duties for GCCS-M, but was not delegated authority to act as the Milestone Decision Authority. Immediately after the canceled MS III review, the GCCS-M program office began discussions with

DASN(C4I) over how to proceed with release approval for GCCS-M 3.1.2.1 and compliance with DOD 5000 and Clinger-Cohen requirements. DASN(C4I) took the position that the program had to achieve statutory and regulatory compliance in order to obtain release of GCCS-M 3.1.2.1.

After the September 11, 2001 terrorist attacks, the GCCS-M program manager increased the urgency of negotiations with DASN(C4I) over Fleet release of GCCS-M 3.1.2.1. The program manager and Commander, SPAWARSYSCOM argued that the enhanced capabilities of GCCS-M 3.1.2.1 would improve Joint interoperability during an anticipated military response against terrorist actors. Commander, SPAWARSYSCOM elevated the release decision of GCCS-M 3.1.2.1 to the PDASN(RDA), and got electronic mail approval from PDASN(RDA) to proceed with the Fleet release of GCCS-M. On 05 October 2001, the PDASN(RDA) officially gave permission to release GCCS-M version 3.1.2.1 for Fleet usage, giving direction to achieve full statutory and regulatory compliance in the next release (ASN(RDA), 2001).

Complicating this decision was a move to make GCCS-M an ACAT-ID program with additional oversight by USD(AT&L). During the summer of 2001, GCCS-M was added to a draft list of programs to be designated as an ACAT ID. However, this list was never made final and there was no further discussion. The May, 2003 5000 series guidance (DOD, 2003a and DOD, 2003b) established the Information Technology Advisory Board (ITAB) to replace the MAISRC that had been eliminated by previous 5000 rewrites. The ITAB permits MAIS programs to receive equivalent OSD-level visibility as Major Defense Acquisition Programs (MDAP) have under the Defense Acquisition Board (DAB).

*c.      **GCCS Family of Systems***

On January 24, 2002 OASD(C3I) convened a meeting of the Command, Control, Communications, Intelligence, Surveillance, Reconnaissance, and Space Systems Overarching Integrated Product Team (C3ISR & Space OIPT) to review the progress each member of the GCCS Family of Systems was making towards “completion of standard acquisition analysis and documentation requirements” (ASD(C3I), 2002). The program was directed to:

Progress toward completion of acquisition analysis and documentation for the entire program while continuing to develop, integrate and field software needed by Service and Joint Warfighters. I approve a phased completion of analysis and documentation in accordance with the plans presented to the OIPT. Each GCCS program must have completed analysis and documentation that covers the program block for which milestone approval is sought. (ASD(C3I), 2002, p. 2)

GCCS-M was directed to present analysis and documentation for its current block (GCCS-M 4.X) at a Program Review during 4<sup>th</sup> Quarter FY2002 and complete program analysis and documentation at a Program Review in FY04.

*d. Achieving Statutory and Regulatory Compliance*

During 2002, almost a decade after ASD(C3I) inquiries on MAISRC review and MAIS designation began, GCCS-M tackled statutory and regulatory compliance. A Program Lifecycle Cost Estimate (PLCCE), an updated Single Acquisition Management Plan (SAMP), an updated Acquisition Program Baseline (APB), and a Clinger-Cohen Act Certification package were prepared in preparation for the ASD(C3I)-directed OIPT Program Review scheduled for 15 September, 2002. The Program Lifecycle Cost Estimate (PLCCE) and the CCA certification package were independently reviewed and approved by the Naval Center for Cost Analysis (NCCA) prior to the program review. The SAMP combines an Acquisition Strategy Report (ASR), Program Protection Plan (PPP), Risk Management Plan (RMP), and other regulatory documentation into a single document. An Acquisition Program Baseline (APB) was also prepared. GCCS-M submitted current acquisition documents to DASN(C4I) for approval and signature. As of the 2002 Program Review, GCCS-M was fully compliant with all statutory and regulatory requirements for the 4.X block except for lacking a JROC-validated requirements document and a C4I Support Plan (that had been waived at an OIPT meeting). The program's existing ORD was approved by the Navy in 1999, but was not validated by the JROC.

**5. Architecture Compliance**

In addition to Fleet-initiated architectures such as IT-21, TF Web, and FORCEnet, DOD has established the Joint Technical Architecture (JTA) as its architectural framework for achieving Joint interoperability through the adoption of standards (DOD,

1996). Adoption of DOD-wide enterprise information technology architecture is also a statutory requirement of the Clinger-Cohen Act of 1996 (CCA, 1996). As information technology continues to evolve, DOD has updated its standards and is currently developing a network centric architecture called the Global Information Grid (GIG) Enterprise Services.

*a. Common Operating Environment*

As previously discussed, a common hardware platform and operating system was identified for JOTS, OSS, POST, and other legacy C2 systems as a way to enhance interoperability. Concurrently, the observation was made that certain functions, such as mapping, track management, and communications interfaces, are fundamentally required for virtually every C4I system. The Navy appeared to be spending a lot of money developing duplicative capabilities from scratch for each system. Even though these systems had many similarities, they could not interoperate with each other since each developer used a proprietary way of presenting information on a map and communicating to external data sources. As JOTS, OSS, POST and other legacy systems were integrated into NTCS-A, their respective C2 capabilities were re-architected to utilize a set of common C2 services for mapping, track management, and shipboard communication interfaces. The result of these observations was the beginnings of the Common Operating Environment (COE) (formerly known as the Defense Information Infrastructure (DII) COE).

In 1993, the former Navy Command and Control Systems Program Manager transferred to the Defense Information Systems Agency (DISA), who was in the process of building a replacement for the World-Wide Military Command and Control System (WWMCCS) (AdaIC, 1997). Global Command and Control System-Joint (GCCS-J), which replaced WWMCCS, is built upon an open architecture that both meets the DOD's unique functional needs (the GCCS-J systems architecture) and provides for interoperability with other systems (the COE technical architecture). The open, technical architecture first developed for NTCS-A was enhanced to provide a similar open, technical architecture for GCCS-J. Later, the architectural framework was unbundled from GCCS-J and provided the baseline for the COE.

The COE was incorporated into Version 1.0 of the Joint Technical Architecture in August, 1996 (DOD, 1996). Because NTCS-A and JMCIS utilized the core services of UB, migration to the COE was more straightforward for the Navy than other services. At the June, 1998 GCCS-M Milestone IID Review the program's name was changed from JMCIS to GCCS-M because the program had successfully adopted the COE architecture (SPAWARSYSCOM, 1998).

The COE concept has significantly improve interoperability between C4I systems, as witnessed by the fact that many capabilities developed for one service C4I system are now fielded by other services. However, managing cost, schedule, and performance dependencies with COE have posed a challenge for GCCS-M and other programs because the COE is a project, not a program. The COE has no Milestone Decision Authority, no appropriated budget, no approved cost and schedule baseline, and no acquisition oversight outside DISA even though it is a key component of the Joint Technical Architecture. Between 2000 and 2002 GCCS-M adjusted its cost and schedule baseline several times because capabilities planned in the COE (such as fully functional PC clients) were delayed. Using the logic that ACAT IAM and ACAT IAC programs couldn't meet to cost and schedule if they were critically dependent upon a non-program without a budget like the COE, the C3ISR OIPT and ASD(NII) obtained Congressional approval to create a new start program in FY 2004 called Network Centric Enterprise Services (NCES).

*b. Future C4I Architecture*

OASD(NII) defines net centricity as “a transformation enabler that empowers all users on the network with the ability to easily discover, access, integrate, and fuse data and services that support their mission objectives” (Krieger, 2003, p. 2). For decades, the model for information sharing between Warfighters has been “Task, Process, Evaluate, and Disseminate” (TPED). Under the net centricity paradigm, the Warfighter waiting to disseminate information until after it has been analyzed unwittingly slows the speed of command and applies an analytical bias to information that might influence how others view or use the results. ASD(NII) advocates switching to the “Task, Post, Process, and Use” (TPPU) model for information sharing to facilitate

storage, management and protection of information resources for warriors, policy makers, and support personnel (Krieger, 2003). NCES is defined as a fast-track concept that transitions programs from the COE-based client-server architecture used by commercial industry in the 1980's to the enterprise services architecture used by commercial industry today. NCES provides:

A common set of net-centric, interoperable information capabilities across the Global Information Grid. These capabilities include on-demand access, collection, processing, storage, dissemination, and management of information to warfighters, policy-makers, and support personnel. Information producers will be able to publish their products in an environment that facilitates consumer discovery, retrieval, and utility. Information consumers will be able to publicize their information needs and then be notified when the required information becomes available. (DISA, 2003, p. 1)

The following figure illustrates today's challenges of exchanging information in a net-centric environment. Consumers of data may not know the data they need is available, may not be able to access it because of organizational or technical barriers, or may have the data but simply not understand it. Simultaneously, producers of data do not know who needs to access their data, what problems they might be having accessing it, and what new capability could be gained if the right person had the right information.



**Figure 8. Net Centric Data Strategy (From: Krieger, 2003, p. 8)**

Following the GCCS-M OT in 2004, the OASD(NII)-led C4ISR OIPT has directed GCCS-M to proceed with a transition to NCES and Joint Command and Control (JC2) based capabilities (ASD(C3I), 2002). The mission need for JC2 is defined as follows:

The Joint Command and Control (JC2) capability will be the Department of Defense (DOD) principal command and control system. The JC2 Operational Requirements Document (ORD) describes the Joint C2 requirements of the National Military Command System (NMCS), Joint Force Commanders (JFC), and the Joint Planning and Execution Community (JPEC). Guided by overarching strategic direction (e.g. National Security Strategy, National Military Strategy, Joint Vision, Defense Planning Guidance, Chairman's Joint Concept of Operations), JC2 will provide agile C2 capabilities allowing joint forces to achieve a tempo of operations, decision-making, and command that adversaries cannot match. JC2 will enable decision superiority via advanced collaborative information sharing achieved through vertical/horizontal joint C2 interoperability. Transformation to future warfighting capabilities requires enhanced battlespace awareness, timely information exchange, and net-centric forces to support critical joint and multinational operations. (JC2 ORD, 2003, p. 1)

#### **D. CHAPTER SUMMARY**

This chapter provided a thorough review of the GCCS-M stakeholder environment, including organizational roles and responsibilities and historical relationships with the GCCS-M program office. Four categories of GCCS-M stakeholders (acquisition oversight, Fleet, contractor, and interface) have been identified from which interviewees will be selected. The statutory, regulatory, and organizational roles and responsibilities assigned to each stakeholder have been identified as they relate to the GGCS-M program. More than fifteen years of program history have been reviewed to identify issues that are important to GCCS-M's stakeholders. Understanding GCCS-M's relationship with stakeholders during this time period provides insight into their current and future expectations.

## IV. DATA COLLECTION AND ANALYSIS

### A. INTRODUCTION

The environmental analysis of Chapter III was used to identify interviewees whose inputs would be valuable to GCCS-M. Focus areas also emerged from the environmental analysis and show areas that interest stakeholders. Interviews were scheduled and conducted using the process outlined in Chapter II. Following the interviews, data was collected and tabulated in two ways. First, the assessment scores assigned by all stakeholders in a given focus area were compared to determine if there is a consistent view among all stakeholders or if assessments vary by role. Second, the expectations of each stakeholder were extracted from the interview and listed together to identify common themes.

### B. SELECTION OF INTERVIEWEES

Based on the environmental analysis in the previous section, the following stakeholders were selected as interviewees. The list of interviewees was peer reviewed by the current GCCS-M program manager, deputy program manager, and a former chief engineer.

<u>Organization</u>	<u>Sub-Organization</u>	<u>Position</u>
PEO C4I & SPACE		Principal
PEO C4I & SPACE		Technical Director
PEO C4I & SPACE	Navy Cryptologic Systems Program Office	PM, Deputy PM, Engineer
CNO	Command and Control Division	GCCS-M Resource Officer
CFFC	N66	Principal
ASD(NII)	C3ISR OIPT	Action Officer
SPAWAR Systems Center San Diego	Command and Control Department	Acting Department Head
Northrop Grumman	Information Technology	Program Manager

**Table 1 Stakeholder Interviewees**

## C. FOCUS AREAS

The environmental analysis also reveals recurring focus areas. The list of focus areas was identified by identifying common themes contained in program and open source documentation. The focus areas were peer reviewed by the current GCCS-M program manager, deputy program manager, and a former chief engineer. The following nine focus areas were identified:

- Operational Capability – Degree to which the capability provided by GCCS-M matches the warfighting need; ORD requirements are effectively implemented.
- Operational Support – Degree to which the GCCS-M program is responsive to the needs of the warfighter using the system, and provides the necessary level of Fleet support required to maintain and operate the system.
- Shipboard Systems Interoperability – Degree to which GCCS-M facilitates the completion of the Joint and Navy warfighter's mission by providing interoperability between the C2 network and shipboard emitters, weapons, sensors, and communications links such as Tomahawk, Aegis, Joint Fires Network, and cryptologic applications.
- Joint/Coalition Interoperability – Degree to which GCCS-M facilitates C2 interoperability between the Joint, Coalition, and Allied forces commander and assigned naval forces through information exchange with GCCS-Joint, other service C2 systems, and NATO systems.
- Return on Investment – Degree to which GCCS-M provides warfighting value relative to the total lifecycle investment (including development, installation, fielding, training, manning, operations, and mission completion).
- Technology Adoption – Degree to which GCCS-M has leveraged and incorporated emergent technologies, including commercial information technology products and capabilities demonstrated through DOD technology

insertion processes such as Fleet Battle Experiments (FBE), Advanced Concept Technology Demonstrations (ACTD) and Future Naval Capabilities (FNC).

- Architecture Compliance – Degree to which GCCS-M complies with Navy and DOD-wide architectural standards and initiatives, including the COE, IT-21, TF Web, NCES, FORCEnet, and Collaboration at Sea.
- Statutory and Regulatory Compliance – Degree to which GCCS-M complies with statutory and regulatory requirements such as Title 10, DOD 5000 series, and the Clinger-Cohen Act.
- Program Planning and Resourcing – Degree to which GCCS-M has successfully defined and structured an acquisition program that is costed, budgeted, and resourced to meet stated operational requirements.

The structured response feedback form that will be completed by the interviewee at the beginning of the interview is contained in Appendix A. An indoctrination brief was prepared to introduce interviewees to the research study's objectives and methodology in order to obtain informed consent for the interview. The indoctrination brief was also peer reviewed by the current GCCS-M program manager, deputy program manager, and former chief engineer. The indoctrination brief used at the start of each interview is included in Appendix B.

## D. RESULTS

The following tables summarize the results of the stakeholder interviews. One interviewee asked that positions and organizations not be associated with responses to the interview questions, so the following steps have been taken to preserve anonymity.

- Scaled response questions are identified by the primary role of the stakeholder, not by the individual's job or organization.
- Guided interview responses are not identified by role, organization, or job.

Focus Area	Stakeholder							
	Oversight			Fleet		Supplier		Interface
	A	B	C	A	B	A	B	A
1 Operational Capability	3	2	0	2	3	3	2	3
2 Operational Support	2	2	0	4	4	2	4	3
3 Shipboard Systems Interoperability	3	2	0	4	3	4	3	2
4 Joint/Coalition Interoperability	3	3	3	1	3	2	2	0
5 Return on Investment	2	1	3	2	3	4	3	3
6 Technology Adoption	2	2	2	3	3	2	2	3
7 Architecture Compliance	4	3	0	3	0	4	4	3
8 Statutory & Regulatory Compliance	3	0	2	4	0	2	0	0
9 Program Planning & Resourcing	2	1	3	1	1	1	0	0

Legend: 4 = Excellent; 3 = Good; 2 = Fair; 1 = Poor; 0 = No Basis

**Table 2 Structured Response Results**

Focus Area	Response Count	Response Rate	Mean	Count			
				Excellent	Good	Fair	Poor
1 Operational Capability	7	88%	2.6	0	4	3	0
2 Operational Support	7	88%	3.0	3	1	3	0
3 Shipboard Systems Interoperability	7	88%	3.0	2	3	2	0
4 Joint/Coalition Interoperability	7	88%	2.4	0	4	2	1
5 Return on Investment	8	100%	2.6	1	4	2	1
6 Technology Adoption	8	100%	2.4	0	3	5	0
7 Architecture Compliance	6	75%	3.5	3	3	0	0
8 Statutory & Regulatory Compliance	4	50%	2.8	1	1	2	0
9 Program Planning & Resourcing	6	75%	1.5	0	1	1	4
Total Interviewees	8						

**Table 3 Focus Area Statistical Summarization**

The following analysis summarizes the interview results by focus area. Scaled response results are analyzed using the methodology established in Chapter II. Detailed interviewee comments are included in Appendix C.

## **1. Operational Capability**

- Scaled Response Results: Clustered around good to fair, with no excellent or poor ratings.
- Guided Interview Results: Most stakeholders believe that the capabilities defined in the GCCS-M ORD are too broad and that the program has tried to be everything to every person instead of focusing on C2. However, several stakeholders felt that C2 needs better definition and GCCS-M needs to help the Fleet figure out how to use C2 capabilities effectively. Stakeholders believe the program should go back to its roots, and send teams of developers out on ships to understand the jobs sailors perform as was done in the early days of JOTS.

## **2. Operational Support**

- Scaled Response Results: About half rated excellent and the other half rated fair.
- Guided Interview Results: Stakeholders believe the program does the best it can with limited resources. Some stakeholders believe the program should aggressively pursue reliability and maintainability fixes while others believe the program may better serve the Fleet by “helping the Fleet help itself” by improving training materials. Most stakeholders agree that the Fleet does not know how to use the capabilities of GCCS-M, and that this situation will get worse before it gets better as the amount of information available in C2 systems increases. Some stakeholders do not believe the Fleet knows how it wants to use all of the information available in a net centric environment, and believe the program needs to help the Fleet figure out its requirements. Some stakeholders believe the program is too quick to respond to the Fleet, but others believe there is no such thing as being too responsive.

### **3. Shipboard Systems Interoperability**

- Scaled Response Results: Widely distributed between excellent and fair.
- Guided Interview Results: Stakeholders agree that there are a lot of shipboard interfaces, but some do not believe the information exchanged in these interfaces is being effectively utilized. Other stakeholders believe that GCCS-M has done a good job of exchanging information with other systems, but needs to move beyond interfaces to information integration and knowledge management.

### **4. Joint/Coalition Interoperability**

- Scaled Response Results: Clustered around good to fair.
- Guided Interview Results: Stakeholders had many different opinions about Joint interoperability. Some felt the program needed to improve vertical integration with the Joint common operational picture by better leveraging the existing data available from shipboard sensors. Others felt that the program needed to improve horizontal integration by developing the capability to share information directly with forces from other services (the way Navy forces share information today). Still others felt that the real problem is cross-domain solutions that will enable information exchanges between security domains.

### **5. Return on Investment**

- Scaled Response Results: Broad distribution, but with over 50% specifying good.
- Guided Interview Results: This focus area is the broadest of the nine, and stakeholders interpreted it in many ways. Several stakeholders felt that GCCS-M has provided a lot of capability for a relatively small amount of money compared to other programs, and felt that C2 systems were ready to go in Operations Enduring Freedom and Iraqi Freedom. Other stakeholders are concerned that most of the GCCS-M investment over the past five years is hidden from capabilities users actually see as they use GCCS-M (in areas like architecture or infrastructure). Stakeholders

believe GCCS-M 4.X has been in development too long, however they understand the program was directed by its previous MDA to follow that course of action. Several stakeholders requested improve cost performance metrics.

## **6. Technology Adoption**

- Scaled Response Results: Clustered around good to fair.
- Guided Interview Results: Stakeholders believe the program has tried to adopt new technologies, but is challenged by having to move a large existing sustained base forward to any next generation technologies. Some stakeholders feel that the Fleet is not able to train and use new technology faster, while others believe that new capabilities should be made available more frequently. Some stakeholders do not believe GCCS-M has embraced new technologies generated through the Navy research and development process.

## **7. Architecture Compliance**

- Scaled Response Results: Clustered around excellent to good.
- Guided Interview Results: Stakeholders feel that the program has done a good job keeping up with the COE, IT-21, and other enterprise architectures, but are divided as to whether too much focus was put on architecture at the expense of capability. Some stakeholders believe that by putting architecture ahead of capability GCCS-M has emerged as one of the most interoperable systems in the Navy, while others believe that the program put too much emphasis on adopting new architectures before they were mature and money would have been better spent on capabilities seen by the Warfighter.

## **8. Statutory & Regulatory Compliance**

- Scaled Response Results: Clustered around good to fair.
- Guided Interview Results: Stakeholders feel the program has improved its statutory and regulatory compliance significantly since its ACAT IAC

designation, but that it still needs a JROC validated requirements document to be completely compliant.

## **9. Program Planning & Resourcing**

- Scaled Response Results: Clustered around poor
- Guided Interview Results: Planning and resourcing emerged throughout most interviews as one of the main areas GCCS-M needs to improve upon. Stakeholders do not believe the program is fully resourced to meet its requirements, and want the program office to work to obtain additional resources by building Fleet stakeholder support for the program and more effective utilization of the PPBS process. The program office, CNO, CFFC, and NETWARCOM should be more closely partnered in planning activities. Stakeholders say the program should stress its mission criticality, role in support of multiple mission areas, interoperability, and Fleet-wide installation footprint during the budgeting process.

## **E. CHAPTER SUMMARY**

The GCCS-M stakeholder interviews have yielded a wealth of information that can be used to improve the capabilities, management, and planning of GCCS-M. Although the initial focus of the interviews was eliciting suggestions for improvement, feedback on what stakeholders believe has gone wrong in the past proved almost as valuable. For these inputs, further analysis will be performed to determine future courses of action that avoid past problems. Analysis of the scaled response questions and the guided interview results show that there are some areas where stakeholders agree on courses of action (such as funding and shipboard interoperability), while there are other areas like Joint interoperability and operational support where widely varied approaches are suggested by different stakeholders. Both types of feedback are extremely valuable to the GCCS-M program.

## V. CONCLUSION

### A. SUMMARY

This research identified a process for eliciting stakeholder expectations, performed an environmental analysis of the GCCS-M program based on existing literature, and approached key stakeholders to obtain their assessment of the program's performance and expectations for the future. Its purpose was to obtain actionable stakeholder feedback that can be used in future strategic planning activities and acquisition planning. This research should yield benefits to the GCCS-M program for years to come as planning documents are updated, however the program will need to be constantly vigilant for changing Warfighter needs.

A mixed-methods research design consisting of literature reviews and focused, qualitative research interviews was selected as the best way to gain insightful input from stakeholders while providing enough structure to compare and contrast results during data analysis. Two types of research interview approaches were used: structured, closed response and guided. This combination of approaches ensured that interviews were focused on the research problem (obtaining stakeholder feedback), but offered flexibility for the interviewer to ask probing questions when interviewee responses needed more clarity, strategic focus, or action-orientation. A detailed process for conducting stakeholder interviews was defined, establishing objectives for the interview duration, location, and format. Interview pre-briefing materials were generated to obtain stakeholder buy-in to the interview.

Interviewees and interview focus areas were identified based on a thorough environmental analysis of the program. Stakeholder organizational roles and responsibilities were identified and discussed in the context of GCCS-M. The historical relationship between GCCS-M and its stakeholders was thoroughly documented using memorandums and other artifacts from the program's acquisition library as well as briefings, policy documents, Naval messages, and publications. The literature review provided a good definition of the program's history and current state, but did not yield clear and actionable direction for future planning. The environmental analysis validated

the starting premise of this research, namely that GCCS-M stakeholders should be approached to elicit their expectations. Before any interviews were conducted, the interview approach, briefing materials, questions, and interviewees were peer reviewed by a group of three senior managers familiar with GCCS-M.

A total of eight stakeholder interviews were conducted. All stakeholders approached for interviews were supportive of participating in GCCS-M strategic planning, and offered very valuable insights into their expectations for GCCS-M. Several stakeholders stated they were pleasantly surprised at being approached for inputs. Several interviews lasted as long as an hour because the stakeholder had great interest in GCCS-M, and had many good ideas for improvements. In some cases, stakeholders had clearly articulated future expectations. In other cases, stakeholders had concerns about past performance, but could not articulate specifics about what the program needed to do to improve performance. In these cases, the program will need to perform a root-cause analysis of the problems identified by the interviews, and propose improvement plans to the stakeholders.

The interview results show several focus areas where stakeholder assessments and expectations are closely aligned, however the interviews revealed several areas where stakeholders lack consensus on the management and technical approaches GCCS-M should pursue. Reconciliation of these differences would provide greater constancy of purpose and program stability, and should be a high priority for the GCCS-M program office.

## **B. LESSONS LEARNED**

During the course of this research, several lessons learned were identified that are useful to keep in mind when eliciting strategy-focused input from stakeholders and performing environmental analysis. Most importantly, representatives of stakeholder organizations selected for strategy-focused interviews need to be comfortable discussing strategic concepts. In cases where the organization's principal leader cannot be accessed directly, a staff member who fully understands the leader's strategy and is empowered to represent the organization's interests can also provide valuable feedback. Informed and

empowered interviewees made the comment that they enjoyed the interview session, and looked forward to seeing their inputs impact the program.

This research would have been much more difficult without access to the GCCS-M Acquisition Library that contains many of the documents referenced in the environmental analysis. Today, most program documents are transmitted and received electronically in their original form, and some are even auto-generated and reported through an online database or web page. Critical program documentation (including electronic mail messages that give direction or communicate guidance) need to be stored more permanently than in the recipients electronic mail archive or on the originator's website.

When preparing for interviews, significant thought needs to be put into the structure and methodology as well as selection of questions and interviewees. The choice of methodology and interview structure can have significant impact on the quality of data obtained during the interview. For example, one member of the interview peer review team recommended elimination of a neutral scaled response cue ("neutral") between "good" and "poor" to prevent interviewees from "walking the middle of the road". During the interviews several interviewees made the comment that they thought their response was in the middle between "good" and "fair". However, further discussions during the guided interview caused the interviewee to go back and definitively pick one of the existing scaled response cues. Forcing the interviewee to decide between "good" and "fair" without offering a "neutral" assessment encouraged the critical thought processes and improved the usability of the results.

## C. CONCLUSION

This research provided information that helps GCCS-M answer the research questions. Stakeholder assessments of current program performance were obtained and expectations for the future were captured. Interviewees offered many strategically focused suggestions and opinions about GCCS-M's current and future performance, including process and cultural changes. Stakeholders did not offer many suggestions for reprioritizing current efforts or quantitatively measuring performance, instead focusing

on the need to better plan and resource the program through the requirements, budget, and acquisition processes. The feedback presented in Appendix C indicates that the right stakeholders were interviewed, the right questions were asked, and that the research methodology successfully elicited quality results. In addition to the original research goals, face-to-face time with stakeholders helped establish closer relationships and demonstrates GCCS-M is committed to a collaborative planning process. Obtaining future-focused stakeholder strategic inputs will help GCCS-M avoid disruptive execution year re-planning and facilitates providing quality inputs into the requirements, budgeting, acquisition processes.

#### **D. SUGGESTED TOPICS FOR FUTURE RESEARCH**

This research provided an application of a structured, qualitative research interview to the GCCS-M program to obtain inputs for strategic planning. The following topics are areas that should be considered for future research.

- **Evaluate the methodology used in this thesis for applicability to another acquisition program.** The interview process, organizational roles and responsibilities, and possibly even focus areas may be applicable beyond GCCS-M. The methodology used in this thesis could assist other programs that desire structured and focused input from stakeholders.
- **Analyze “lessons learned” from evolutionary acquisition early adopters to show how programs are balancing new capabilities and lifecycle support.**

There are other programs besides GCCS-M that have been using evolutionary acquisition strategies since the 1980s. Many of these programs are software intensive programs that have successfully fielded incremental capabilities, but have done so by following “build-to-budget” finance strategies versus more stable and defendable “fund to requirements” strategies. Areas where useful lessons learned exist include balancing funding for development of new capabilities and support; Fleet initiatives; statutory and regulatory compliance; COTS adoption; and architecture compliance. These lessons learned could

benefit many other programs now that DOD 5000 has identified evolutionary acquisition as the preferred approach.

- **Explore ways to synthesize comments from the hands-on, operational users into strategic plans.** The interviews in this thesis are focused at the SES, O-6, and GS-15 equivalent level who are representatives of the actual officer and enlisted personnel using GCCS-M to perform Warfighting missions. This research assumed interviewees had a larger perspective of cost, schedule, performance, requirements, supportability, future military needs, processes, and future Naval vision than many shipboard C2 leaders have. Within the commercial and military product development disciplines there are many widely published methodologies for eliciting customer needs and synthesizing the results into a requirements document. This is a difficult task, but it is even more difficult to synthesize inputs from an operational user into an acquisition strategy, contracting strategy, architecture, or technology road map.

Eliciting constructive criticism from stakeholders can be an intimidating process, particularly when prior knowledge suggests that stakeholders believe there is room for improvement. GCCS-M is a highly successful acquisition program fielded broadly across the Department of Navy, but even successful programs must continuously improve as mission needs and technologies evolve. The GCCS-M stakeholders appreciated their role in the strategic planning process, and demonstrated their willingness to participate by offering candid, objective, and deliberative responses revealing new perspectives on old problems. It turns out that the toughest critics provided the most insightful and valuable suggestions for improvement. Upon reviewing this thesis, the GCCS-M program manager declared that it will be mandatory reading for all staff prior to the program's next quarterly strategic planning offsite. The results of this research enable GCCS-M to better meet its primary mission: Provide the most effective and efficient C2 solution possible, ensuring Warfighters complete assigned missions and return home safely.

THIS PAGE INTENTIONALLY LEFT BLANK

## **APPENDIX A: INTERVIEW STRUCTURED RESPONSE QUESTIONS**

**DIRECTIONS:** Circle the answer that best reflects how you feel GCCS-M is performing in each area. If you do not have sufficient information to make a choice, mark “No Basis to Rate.”

- Operational Capability – Degree to which the capability provided by GCCS-M matches the warfighting need; ORD requirements are effectively implemented.

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Operational Support – Degree to which the GCCS-M program is responsive to the needs of the warfighter using the system, and provides the necessary level of Fleet support required to maintain and operate the system.

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Shipboard Systems Interoperability – Degree to which GCCS-M facilitates the completion of the Joint and Navy warfighter’s mission by providing interoperability between the C2 network and shipboard emitters, weapons, sensors, and communications links such as Tomahawk, Aegis, Joint Fires Network, and Cryptologic applications.

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Joint/Coalition Interoperability – Degree to which GCCS-M facilitates C2 interoperability between the Joint, Coalition, and Allied forces commander and assigned naval forces through information exchange with GCCS-Joint, other service C2 systems, and NATO systems.

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Return on Investment – Degree to which GCCS-M provides warfighting value relative to the total lifecycle investment (including development, installation, fielding, training, manning, operations, and mission completion).

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Technology Adoption – Degree to which GCCS-M has leveraged and incorporated emergent technologies, including commercial information technology products and capabilities demonstrated through DOD technology insertion processes such as Fleet Battle Experiments (FBE), Advanced Concept Technology Demonstrations (ACTD) and Future Naval Capabilities (FNC).

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Architecture Compliance – Degree to which GCCS-M complies with Navy and DOD-wide architectural standards and initiatives, including the COE, IT-21, TF Web, NCES, FORCEnet, and Collaboration at Sea.

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Statutory and Regulatory Compliance – Degree to which GCCS-M complies with statutory and regulatory requirements such as Title 10, DOD 5000 series, and the Clinger-Cohen Act.

**Excellent      Good      Fair      Poor      No Basis to Rate**

- Program Planning and Resourcing – Degree to which GCCS-M has successfully defined and structured an acquisition program that is costed, budgeted, and resourced to meet stated operational requirements.

**Excellent      Good      Fair      Poor      No Basis to Rate**

## APPENDIX B: INTERVIEW INDOCTRINATION BRIEF

### Overview



- ***Objective:***
  - Interview Key GCCS-M Stakeholders to Obtain Expectations & Ideas
  - Look for Common Ground Among Stakeholders
    - Apply Same Methodology, Same Questions
- ***Uses of Data:***
  - GCCS-M Strategic Planning & Resource Prioritization
  - Thesis Research
- ***Who is Being Interviewed?***
  - PEO, CNO, CFFC, NETWARCOM, CPF, SPAWAR, ASD(NII), DASN(C4I), Fleet, PACOM, JFCOM, Industry, Other PMO

### Interview Approach



- ***Step 1: Methodology Identification***
  - Nine Focus Areas

Operational Capability	Joint Interoperability	Architecture Compliance
Operational Support	Return on Investment	Statutory & Regulatory Compliance
Shipboard Interoperability	Technology Adoption	Program Planning & Resourcing
- ***Step 2: Quantitative Assessment***
  - Evaluate Performance in Each Focus Area
    - Understood Not All Stakeholders Track Every Area
  - Rating Scale: Excellent, Good, Fair, Poor, No Basis
- ***Step 3: Qualitative Elaboration***
  - Stakeholder Ideas for Improvement, Re-Prioritization, Strategic Redirection, or Cultural Change.
  - Discuss Lowest Assessments First in Interest of Time
  - Again, Please Look Beyond “Do More with Less”
    - Status Quo – If You Like The Results, We Can Stop Now!

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX C: INTERVIEW GUIDED QUESTION RESPONSES

### A. OPERATIONAL CAPABILITY

- “Due to all kinds of external circumstances we focused a lot of resources on getting to version 4.X, and getting into the next generation COE build long before it was ready. A lot of the focus on Fleet issues like accuracy, timeliness, and reliability got pushed to the side in favor of keeping up with the Joneses. I think this had a major detriment to GCCS-M in terms of its tactical relevance. I think we are beginning to recover, but it is slow.”
- “At the Seventh Fleet N6 Conference, the COP got a significant amount of good press.”
- “We’re not going out to the users saying what did you like, what did you not like, how can we fix it. Until we do that, we’re not going to be in the good to excellent category.”
- “We need to focus on management of the tactical picture. We were the only service focused on tactical management before 4.X, but we got refocused on making 4.X work several years ago. No one else picked up the tactical picture management, it just went away, and the Fleet has noticed.”
- “There are some capabilities we field that do not get used. We continue to spend money fielding them. The Fleet hardly uses JMHS except for a few ships and shore sites. For the most part the Fleet is using Fleet SIPRNET Messaging or just plain Exchange and settling for the search capabilities available in those tools.”
- “The TDAMS report shows a lot of tools in the COE Maritime that are hardly ever used, such as Screen Kilo and Four Whiskey. C2WC and EWCS fall into that category also.”
- “The Fleet has said we need CONOPS for chat room management, but what we really need to do is figure out what is happening inside chat rooms and build tools that capture that work flow. Any workflow tool needs to be collaborative.”
- “Given the way GCCS-M came about, from JOTS, the operational capability originally was excellent because it was driven by some very bright people who had recent operational knowledge and they were able to make the system very relevant to how business was done back in the late 1980’s. As we progress towards the future, the way we do business is very, very different. The whole concept is managing your actions through the analysis of information and trying to get inside the OODA loop to be a

faster decision maker. I don't believe there are very skilled individuals available yet who have the hands-on experience required to build a system that works this way.”

- “I don't think the current 1999 ORD accurately reflects the Warfighter's needs.”
- “The program is stretched too thin. The program tried to be everything to everybody, and what it really needed to do was be a C2 system. But you can define almost everything to be C2. We need to define and focus on what is really C2. The program has gotten very big and has many dependencies that must be managed. We need to say no sometimes.”
- “The Fleet is floundering when it comes to information management. They are getting too much information out of C2 systems, and they don't know what to do with it. However, they won't know what they are looking for to solve the problem until they find it. It is hard to build a system to those needs. It is incumbent upon the GCCS-M program office to help the Fleet figure out what they want.”
- “Knowledge management is a key contributor to how GCCS-M will be used in the future. You can't build a system until you understand how you want the data to flow, and how people are going to use it. Knowledge management is so new that the Fleet doesn't know how to take advantage of it.”
- “I don't think anyone thought chat rooms would be as big as they are. They are changing the culture. Sitting down and looking at the workflow, and how the data moves through systems, helps the Fleet understand how information flows. This helps define the CONOPS, and helps the program office build a capability that better reflects the operational need. We need to send analysts out to ride ships, watch the information flow, and figure out what it is used for.”
- “For the most part, we can build on top of the capability as it is delivered to us. There are some areas like HITS and message profiling that have not always worked smoothly.”
- “Maybe we ought to have an N3 Conference, instead of an N6 Conference.”
- “People are not fully using the capabilities. Maybe it's too hard, not intuitive, or we don't have enough training, or it's just not sexy enough. Maybe it's like Microsoft Word. I only use 20% of the capability and I know there's a lot more that I would just never take the time to learn.”
- “I hope computer based training, which we are starting to put in place now, will help people run through operational scenarios and demonstrate the full capability, so they will use it.”

- “In the early days, we could have a CCB one day, get it through the developer and the test labs, and have capability out to the Fleet in a week. We had a process, but it was fast. Now we have to go through so many chains of coordination with the COE, testing, and oversight. We’ve lost the speed to capability.”
- “The core competency of GCCS-M should be C2, but I think that core competency has become diluted with other capabilities. A lot of bells and whistles have been added on.”
- “The ability to turn a new capability out rapidly has been lost.”
- “There is a frustration that it takes too long to get new capability out. When we ask the users for input, they aren’t motivated to submit improvements because they feel they won’t see the outcome during their career. We still need to maintain operational effectiveness while we put out new capabilities, so we have to balance speed with support.”
- “We have added a lot of tools into GCCS-M. When Admiral Clark was here, and we would go out to ships, I was amazed at his functional knowledge of the system. He would start grilling the operators on whether they used specific tactical decision aids. They were turning gray because they didn’t know as much as he did.”
- “The systems have to be intuitive to use. GCCS-M tried to solve world hunger, because people asked you to do that.”

## B. OPERATIONAL SUPPORT

- “The incident on USS Enterprise during OEF where we had difficulty tracking down the reason for a failure concerns me. Given the importance of GCCS-M in OIF, we should not be limited by the number of tracks. We may not have stressed the system in a situation similar to Enterprise since the problems occurred there (or experienced the right circumstances that would cause the problems to be duplicated). I think the concerns about the Enterprise problem are broader than more than one or two people.”
- “Need to figure out a way to make the system more robust”
- “May need to do more testing in a test environment that is representative of how we are operationally stressing the system. During surge warfare there are 3 to 5 battle groups in a geographic area at a moment’s notice. We do not test that way.”
- “It is painfully obvious when we haven’t met the goal, and we get CASREPs from the Fleet”.
- “There are some people who are trained and know how to make GCCS-M work, but there are many others who don’t find it useful for a variety of reasons.”

- “The real Fleet users have been relying on our FSETs and surge support from our training teams. We’re stretched pretty thin on resources, but I’m not sure we are leveraging our training resources properly.”
- “The crews on the ships are not well trained. There are all kinds of reasons for that. Can we consolidate the training money to really support the Warfighter through something like an augmented FSET team? JFN has been very successful using this approach.”
- “Given the Navy-wide footprint of the system, and given the resources applied, the response to problems is very good. From an industrial perspective it is fair or poor because if this were an industrial concern you would charge directly for the maintenance, and you could be extremely responsive (for a price). The whole architecture of the Navy system does not allow that. Between the various fiefdoms of who is supposed to maintain and support, and the slow moving process to change that, and the pervasiveness of IT, and who pays for what; it’s fractured.”
- “As we move forward in a Joint DOD environment where we do work in the information world, there has to be the recognition that Command and Control is going to be something more than people do in their spare time. That has to influence the career path of people who are in harm’s way. The same model that applies to understanding how the shipboard missile system works needs to be applied, which means that an officer’s career repetitively puts him or her through an update of knowledge about the missile/fire control work flow. Something like this has to happen for C2, and it is not. People get one hour of C2 at department head school. The tactical application of C2 has to match a career path through the various stages of professional development. If this gets imbedded in the social fabric, then operational support will take on the same quality as it does today for combat systems. The support needs to be more closely embedded at the waterfront.”
- “There will be fewer sailors involved in the future. The mechanisms by which SSA’s and ISEA’s function are going to need to be focused and streamlined. Competition and duplication between field activities needs to be eliminated. I do not know how to do this in the NWCF/DBOF environment.”
- “GCCS-M is almost too responsive to the Fleet. When the Fleet squeaks, the threshold for tolerance within the program office is very low. The program is very proactive at trying to meet the Fleet needs, but money is an issue.”
- “As soon as the Fleet squeaks, people think they need to send someone out, fix something, or update software. I think our first response should be to investigate a non-material solution. The program’s attitude is that you need to take care of it internally. Instead, the thought process should be

“What can we do to help the Fleet help themselves?” That is not the first approach GCCS-M takes.”

- “When there is a problem, this program has done a fantastic job at pulling the resources together to fix the problem in a short amount of time.”
- “The warfighter is our customer; we can never be too responsive.”
- “The scale does not go high enough to evaluate the operational support. It has been phenomenal, between FCTCLANT and SPAWAR. There is always someone ready to go out and help the Fleet. I have been here 15 years, and it has never been better.”
- “The consolidated installation process has resulted in a situation where no one is in charge. I want to be able to hold the program manager accountable.”
- “The integrated install is a good thing for the ship, but in terms of bottom line dollars no programs I know of have had costs decrease. I don’t know if the consolidated install is worth the cost, because I have never seen an actual cost reported. Before, I knew every cost down to the penny. I can’t get that anymore.”
- “We should get everyone who does LAN installs (for example) together, and put out an installation specification, and have them come back in a week and bid against each other for the work. We would still use best value, but there are multiple companies out there who are qualified to do the work and do a good job.”
- “If costs are running higher than plan, I need to know that in January not in August. By then its too late to make changes and re-prioritize.”

## C. SHIPBOARD SYSTEMS INTEROPERABILITY

- “GCCS-M is caught in an identity crisis since the Fleet is still struggling with how to use the tactical picture. We have interoperability with a lot of systems, but we have a hard time pulling it all together. I find it ironic that the Joint Fires Network interfaces better with CDL than GCCS-M. CDL and GCCS-M are in the same command! Hardly anyone working in GCCS-M knows how to connect to that sensor, and what types of data could be obtained.”
- “GCCS-M is the jack-of-all-trades, but the master of none. We have good interoperability because we talk to all these sensors. I can’t think of any system that has more connections to shipboard systems than GCCS-M. From that perspective we are excellent. But is it a good interface? Is the other side of the interface honored? The quality and usage of interfaces needs to be worked.”
- “When I look at the GCCS architecture on platforms, there are very few systems in the Navy that are as interoperable as GCCS-M. There has been

no recognition from Navy leadership that we have already achieved most of FORCEnet with existing PMW 157, PMW 189, and ADNS projects. I would have that as one of the poster children of leveraging interoperability. Good solid engineers went out and made it happen. The only reason we've accomplished what we have today is because of the GCCS-M infrastructure.”

- “I think the 3.X series was based on interoperability between systems. The program achieved the goal of getting stovepiped systems to talk with each other. But that is not enough now, they have raised the bar. The goal line has moved to the point where systems don’t just need to talk with each other, they have to work together. We still have work to do to take that next step. There are features in 4.X that will help build integrated capabilities.”
- “The synchronization of the track picture between security enclaves needs to be improved. Users do not trust the system to correctly bring the COP onto the high side.”
- “Some of the interfaces are manual, requiring operator intervention. We need to try to automate those.”
- “It’s very difficult to maintain all the interfaces when everyone around you is changing them. The COE is making changes, and the other systems are making changes.”
- “I think we could partner with systems a little better to build a more integrated C4I solution for the Warfighter. There is a lot of finger-pointing that goes on between NAVSEA and SPAWAR over who is responsible for supporting interfaces, or fixing them when they break. This applies to testing of these interfaces, as well”
- “Real time systems fundamentally do not like to connect to a non-real-time system. Overcoming the near-real-time perception continues to be a tough sell to the weapons grid.”
- “I killed the system of systems interoperability test because every problem identified in these tests was identified in the original system-level SOVT. Every single one. I was paying twice for the same test. The ships love the system SOVT test because they get more training. There are knowledgeable guys who come aboard and the ship can pick their brains. I knew I was potentially shooting myself in the foot, but we just can’t pay for the same test twice.”
- “The capabilities of ADSI were supposed to be integrated into GCCS-M in 1997 or 1998. It was never resourced, but at this point we’ve the Fleet has bought ADSI boxes for just about everyone who needs it. There are several other examples.”
- “Our concern on interoperability is whether LANT and PAC ships can leave their respective home ports, meet up in the Indian Ocean, and ensure

that we are still interoperable. There are so many different versions of so many systems out there; it is a nightmare to keep them straight and understand what works together. Maintaining backward interoperability is key.”

- “The combat systems have had six ships fail to make deployment because systems were not ready; SPAWAR has never done that with the C4I capability.”

#### D. JOINT/COALITION INTEROPERABILITY

- “The perceived need is to focus on horizontal interoperability (e.g. Navy unit to Army unit) vice vertical interoperability that we have done reasonably well at to date. However, the requirement for horizontal interoperability needs to be better articulated.”
- “Navy/coalition interoperability agreements have been beneficial.”
- “The main issue here is that we need to get our shipboard data into the Joint C2 system to show the value of GCCS-M.”
- “I don’t think anyone knows what C2 means in a coalition environment yet. What does the operator really want to do in this environment?”
- “The main issue is cross-domain solutions. All we have is a guard and a serial connection on the coalition side. The reason VCNO is concerned about cross-domain solutions is because he has four computers under his desk. He wants to know why those computers have to be separate. We still need UNCLASS, SECRET, TS, and coalition computers.”
- “We have not done a good job at implementing MLS solutions.”
- “There is more activity and focus on the Joint solution than ever before, due to MID 912 and JFCOM involvement.”

#### E. RETURN ON INVESTMENT

- “We spend a lot of money on GCCS-M, and I don’t see a whole lot of stuff coming out the door on the product line.”
- “Since the year 2000 we’ve had two releases. That’s a lot of people and a lot of dollars. We’ve waited a lot of years for 4.X. I’m worried about somebody doing the ROI calculation on GCCS-M, and asking the question why aren’t we getting more rapid technology insertion and new functionality for the investment.”
- “I need cost performance data on GCCS-M to ensure that the program is operating efficiently and effectively.”

- “Across the Family of Systems, the benefit gained for a relatively small investment has been substantial. I don’t think we consume huge dollars to get the capability.”
- “ROI is capability based, not economic. The question that must be answered is can the Warfighter plan, execute, decide, and detect in a more efficient manner because of the tools. This needs to take quality and timeliness into account. It is much more subjective than bending metal at the shipyard.”
- “We spent a lot of money fixing a product that wasn’t ready for prime time, and didn’t spend money making a product that was prime time. How many millions of dollars did we spend migrating to 4.X?”
- “It’s hard to figure out where the C2 system ends, and the supporting infrastructure takes over.”
- “I remember what had to be done to prepare the Navy for Operation Desert Storm, and I compare that to what had to be done for Operation Iraqi Freedom this time around. It seems to me the overall job this time was harder, because we went at it alone. Yet for C2 it was essentially sail away and go. Our fielded C2 capabilities were as modern as they could be; things weren’t sitting on the shelf waiting to get out there. The fact that people could take the installed product and do the job makes the return on investment excellent. For Desert Storm, an unbelievable industrial surge occurred to prepare forces to perform C2. For OIF, it was transparent; it just happened.”
- “Requirements and needs are changing more rapidly than the investment process. You could be much more responsive without the hurdles imposed by the testing and acquisition processes, but that’s the environment GCCS-M is in.”
- “Over the past couple of years, most of the money has been sunk into future capabilities like 4.X or infrastructure changes like COP Sync Tools. In the eyes of the Fleet, not a whole lot has changed. The capability seen by most users has not changed. The changes have been significant, but invisible to most users.”
- “Operators and officers don’t know what the system can do; they do not know its capabilities. There is a major training issue out there for the leadership, not just the system operators. I’m afraid that people are going to use the 4.X system the same way that they use 3.X today, and that the investment we’ve made in 4.X will be lost.”
- “We need to train the officers better, not just on the tools but how to do C2. The operators are just going to do what the leadership wants. Very few operators will go above and beyond, and look for new ways to use the system. They will just provide what they are asked for. We train the operators well, but the leadership doesn’t understand what the system is

capable of. We need to focus on the O-3 through O-5 level officers who define the information requirements.

- “It is going to fall on the program office to facilitate the environment where the Fleet defines an enterprise C2 process. NETWARCOM, 2<sup>nd</sup> Fleet, and 7<sup>th</sup> Fleet should participate. The N3’s need to be involved. The Navy is the only service where the N6’s get involved in C2 requirements.”
- “We no longer have to develop things ourselves that are in the COE or GCCS-M.”
- “We probably could have done things cheaper or better in retrospect, but given where we started from in the late 1980’s we have come a long way, and have spent a lot less money than a lot of other programs that I think have been less successful.”
- “From a command ship and carrier perspective, there is no doubt in my mind that they couldn’t do their jobs without it. On ships with combat systems, the operators lean on that data instead. Everyone is really expecting a real-time system, and they know GCCS-M was not designed to be that type of system. Overall, it does what we built it to do.”

## F. TECHNOLOGY ADOPTION

- “It isn’t that GCCS-M has reluctance to adopt technology, it’s just that technology takes forever to get out there. I honestly give you credit for embracing technology. Let’s talk about 3DCOP – there’s an example of technology that you proactively looked at. But tied to return on investment and the speed issue, releases don’t go out very often and we don’t refresh the technology.”
- “Quarterly releases are too aggressive; annual would be a good objective to shoot for. Those releases should go through an abbreviated assessment that would not require a full OT.”
- “GCCS-M has actively pursued technology, but has been held back by dependencies on delayed next generation capabilities such as the COE and the challenges of moving a sustained base forward to next generation technologies.”
- “I think we’ve done better in the past few years at leveraging science and technology investments. The Fleet Battle Experiments are a good example of this.”
- “Consider being more aggressive with XTCF in order to ensure GCCS-M has a seat at the table in Situation Awareness.”
- “When industry decides to incorporate technology, it spends a lot of money because you have to show a very direct link between investment and financial return on investment.”

- “The Fleet experimentation process is broken, because you just show up with what you have. In IT, it is hard to distinguish between what each player is bringing. Frequently, the recognized successes are riding on infrastructure provided by someone else who is not getting recognized (like GCCS-M).”
- “We’ve talked about a few new technologies, but we really haven’t transitioned a whole lot. We have picked up many commercial technologies. We were way ahead on web-enablement. From an operator perspective, I think we are moving as fast as the CONOPS and learning methods are changing.”
- “The technology adoption and transition process within GCCS-M is ad-hoc. We either get beat up for not telling you about a good idea sooner, or if we do tell you about it early, all we hear back that you have to POM for it and it will take at least 3 years if we get anything at all. We need to be implementing something similar to what the submarine community does, called SUBTECH. They have a formal and fair process, including an R&D group and allocations in the POM process for emerging technologies. We do not have a good, seamless approach for getting new technology into the product.”
- “A previous PM was here for three years before he met the ONR C2 block head, just three weeks before he left. That’s not right.”
- “We get a new whiz-bang tool developed and ready to go, but then there isn’t enough money to give it to everyone. We then have to make very hard decisions about who gets what, and in the end decide who doesn’t get a warfighting capability.”
- “We can support 30 year old UYK-20’s, but we can’t support 18 month old commercial servers. We’ve gotten into the habit that we have to move forward with technology just because there is a new or improved version available. Why do we need to do that? We haven’t attached any performance or operational requirements to this chase of technology. What is Netscape 6 doing that Netscape 5.5 didn’t do? The same thing is true on the hardware side. Things keep getting better and faster, but what performance improvement does that bring in capability terms. I would have thought the budget situation would stop us from doing this, but it hasn’t.”
- “Commercial vendors change the size and form factor of their equipment without telling anyone. The government has no configuration management of the form factor. We engineer mounts and brackets to hold these things, and then the COTS vendor delivers something that just doesn’t fit. We don’t always think about these things until the installer is on the ship, and it’s a crisis.”

## G. ARCHITECTURE COMPLIANCE

- “Continue to move towards a single Joint architecture with common Joint applications.”
- “Utilize and fully expose data, and utilize enterprise services.”
- “If you look at what we do and how we spend our money, it is on Joint interoperability and architecture. It’s not on capabilities and shipboard interoperability. We need to make sure we have the right balance here. I don’t think we are balanced today.”
- “Excellent. If it hadn’t been for compliance with COE none of the things we’ve done would have successful.”
- “I think it was the right decision to put the architecture before the capability. The Windows architecture was there before industry knew how to use IT. People didn’t need to worry about whether the file sent across country would work on another machine. DOD approached this from a different perspective. The biggest gorilla said that COE was the law of the land. Those who listened built interoperable systems. Those who didn’t built stovepipes. The drawback is that people see the tools and say they can figure out how to use them without learning the business of C2. Now we need to figure out how the tool business logic can adopt yet be flexible enough to accommodate unexpected uses driven by operational need.”
- “If we truly complied with the architecture, we should be able to take one of our apps and load it on the GCCS-J system. We can’t do that today, and a lot of people know that.”
- “Putting architecture ahead of capability is like building a solid foundation for your house. You could build a beautiful house on fragile stilts, but if you do this you don’t have stable foundation and the whole thing could blow away in the first storm.”
- “We put a whole lot of money into 4.X, just to maintain interoperability with GCCS-M.”
- “The architecture is the foundation of GCCS-M, it defined and created C2 interoperability.”
- “Architectures are not the end state, the capability is. The guy on the ship doesn’t stop to think what architecture is being used. All he cares about is whether he can communicate with who he wants to, or put bombs on target.”

## **H. STATUTORY AND REGULATORY COMPLIANCE**

- “The plan is in place to get there, but there are a lot of dependencies. Today there are some holes and gaps due to the service approved ORD that ripple throughout.”
- “I’m glad we didn’t pay attention to this when we started, otherwise we wouldn’t be here. I would hate to see it become excellent.”
- “Under the ACAT II, this was poor, but over the past few years we have come along way. Now the biggest problem is folks sitting on our paperwork.”

## **I. PROGRAM PLANNING AND RESOURCING**

- “The question is whether we are getting our dollars worth considering the rate we turn products out. I’m worried that we are falling behind the customer’s reasonable expectations.”
- “The problem is that the Navy doesn’t have enough resources to do everything it wants to continue doing. So, we are under-resourcing almost everything we do. Some of our sister services don’t do that, but we do. We would rather have more systems limping along than fewer systems that are in good health, so GCCS-M is a victim of that mentality along with many other programs. I think now you need to be making the case for higher availability and robustness of your system as a nearly critical warfighting element. In the past you have been a C4I informational system. The way I read lessons learned out of OIF that’s not the case any more; they can’t do their job without GCCS-M. We need to begin to make that argument at the resourcing table.”
- “Should JC2 MA be a new start? If it will still be an ACAT I program then I don’t see much reason not to continue with spiral development under the existing program structure.”
- “You will need to have a balance between supporting the current system and enhancing for the future.
- “Who is going to support COE for the seven years we have it in the Fleet, before we get to NCES? In their budget DISA has decimated support for COE because they are putting all their eggs in the future basket. I recommend continuing with a spiral model and make arguments at the budget table when someone tries to cut GCCS-M.”
- “We need to correct the build-to-budget mindset that has developed because we are not funded to threshold requirements. We need to force the hard decisions needed to make the resources available, if we really want the capability.”

- “Within the resources available, GCCS-M has laid out a plan to deliver capability.”
- “The requirements and resourcing system is not working for IT programs. It is not poor for IT programs that deal with bandwidth, because that is something people can see, but it is certainly poor for the mushy capabilities like GCCS-M. I believe there is a perception that you can “go cheap” on integration of applications. You can’t do that anymore. Program managers do what they can do with the funding available, but that encourages bridges to nowhere that look effective on a small scale but don’t integrate back together.”
- “In the next war, I would rather have one less airplane airborne and be able to react quickly across the enterprise. There is a lot of C2 capability that could be built with the funds required to buy one JSF. But I wouldn’t cut a ship.”
- “The resourcing problem needs to be solved by a team approach, including the program office, OPNAV, NETWARCOM, and CFFC.”
- “Right now we are so busy taking care of the immediate concerns that we are not looking ahead. We need to rethink why every ship in the Navy needs GCCS-M. What is the justification for putting GCCS-M on an AOE? We need to take a look at missions, not platforms. We need to take missions and figure out what C2 capabilities are required to support each mission. What missions does an AOE perform? This is the biggest shortfall in the requirements process. This analysis needs to be performed by the N3’s, and right now they just say we need everything. OPNAV should have the lead on this since it is strategic, but we really need N3 involvement.”
- “Sometimes I have plenty of money but it’s the wrong color to do what needs to get done. I agree with Secretary Rumsfeld, the whole budget system needs reworked.”
- “Senior leadership in the Navy has failed the Fleet miserably, because the budget for the Navy C4I capability has been static. IT-21 is roughly \$300M per year. The Navy has \$88B dollars per year. IT-21 is the soul of C4I in the Fleet. The first thing the US military goes after is the C2 of the bad guy. Of that \$300M, most of that is for installation labor and travel. The Fleet only gets about \$80M to actually procure equipment each year. This is insanity. We have to get capability end to end across the Battlegroup. The budget needs to support delivery of an integrated and interoperable end-to-end capability, that is linked up between both LANT and PAC.”
- “We don’t have technical issues with our C2 capability, we have money issues. A B-2 bomber plus its spare parts and infrastructure is about \$1B. In the next conflict, will a single B-2 bomber make a strategic difference? I don’t think it will. If you invested that \$1B in Navy C2, it will make a

strategic difference. We have not been able to articulate what C4I is worth. This is the K-Mart special office, and today's blue light special is on GCCS-M. I would sacrifice a ship, but I'm not sure CNO would. It is our collective job to sell this end-to-end capability, and we are not doing it effectively.”

- “The Fleet likes the IT-21 matrix because that’s the only time we get a say in priorities. Sometimes we see program office schedules that just don’t make sense.”

## LIST OF REFERENCES

Ada Information Clearinghouse (AdaIC). (1997). Plug and Play for the War-fighter. Retrieved 18 July 2003 from the World Wide Web:  
<http://archive.adaic.com/news/Newsletter/1997/fall/7.htm>

Ancona, D. (Ed.). (1999). Managing for the Future: Organizational Behavior & Processes. Cincinnati, OH: South-Western College Publishing.

Anthony, R., Hawkins, D., Merchant, K. (1999). Accounting: Text and Cases. New York: McGraw-Hill.

Armistead, LCDR L. (2003) "Task Force Web NPS Brief". Naval Postgraduate School. Retrieved 13 July 2003 from the World Wide Web:  
[http://ci.nps.navy.mil/downloads/INVLECT/TFW\\_03.ppt](http://ci.nps.navy.mil/downloads/INVLECT/TFW_03.ppt)

Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C3I)). (1993). Navy Operations Support System.

Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C3I)). (1995). Designation of Operations Support System (OSS) as Major Automated Information System (MAIS).

Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C3I)). (1996). MAISRC Reporting Requirement for Joint Maritime Command Information System (JMCIS).

Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C3I)). (1999). Designation of Major Automated Information System Acquisition Programs/Special Interest Initiatives and Related Oversight Requirements.

Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C3I)). (2001). Designation of Major Automated Information System (MAIS) Acquisition Program.

Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD(C3I)). (2002). Global Command and Control System (GCCS)-Army, GCCS-Air Force, GCCS-Maritime, GCCS (Joint) -- Acquisition Decision Memorandum.

Assistant Secretary of Defense for Networks and Information Integration (ASD(NII)). What is ASD(NII). Retrieved 20 July 2003 from the World Wide Web:  
<http://www.defenselink.mil/niif/faq/index.html#1>.

Assistant Secretary of the Navy for Research, Development and Acquisition (ASN(RDA)). Deputy Assistant Secretaries of the Navy and Directors. Retrieved 27 July 2003 from the World Wide Web: [http://www.hq.navy.mil/rda/DASN\\_DIR.asp](http://www.hq.navy.mil/rda/DASN_DIR.asp)

Assistant Secretary of the Navy for Research, Development and Acquisition (ASN(RDA)). (1997). Delegation of Milestone Decision Authority for the Naval Tactical Command System-Afloat (NTCS-A).

Chairman of the Joint Chiefs of Staff (CJCS). (2003) Joint Capabilities Integration and Development System. (Chairman of the Joint Chiefs of Staff Instruction 3170.01). Retrieved 2 August 2003 from the World Wide Web: <http://dod5000.dau.mil/>.

Chief of Naval Operations (CNO). (1991). Decision Coordinating Paper for the Navy Tactical Command System – Afloat (NTCS-A).

Chief of Naval Operations (CNO). (1993). Navy Operations Support System.

Chief of Naval Operations (CNO). (1995). Designation of Major Automated Information System Programs.

Chief of Naval Operations (CNO). (1997). Preparation of the FY1999 Budget Estimates to the Office of the Secretary of Defense and the Office of Management and Budget for Information Technology Budget Exhibits.

Chief of Naval Operations (CNO). (2001). Navy Alignment. Navigator of the Navy. Retrieved 20 July 2003 from the World Wide Web:  
[http://www.navigator.navy.mil/navigator/ECDIS/Naval\\_Messages/R\\_131339Z\\_AUG\\_01.htm](http://www.navigator.navy.mil/navigator/ECDIS/Naval_Messages/R_131339Z_AUG_01.htm)

Chief of Naval Operations (CNO). N6 PPBS Online Tutorial. Retrieved 10 July 2003 from the World Wide Web: <http://cno-n6.hq.navy.mil/N6E/PPBS/default.htm>

CHIPS Magazine Online. (2003) Interview with Mr. Dennis Bauman, PEO-C4I & Space. Retrieved 20 July 2003 from the World Wide Web:  
[http://www.chips.navy.mil/archives/03\\_summer/PDF/PEO-C4I.pdf](http://www.chips.navy.mil/archives/03_summer/PDF/PEO-C4I.pdf)

Clemmins, ADM A. (1997). IT-21: The Path to Information Superiority. CHIPS Magazine Online. Retrieved 13 July 2003 from the World Wide Web:  
[http://www.chips.navy.mil/archives/97\\_jul/contents.htm](http://www.chips.navy.mil/archives/97_jul/contents.htm)

Clinger-Cohen Act (CCA) of 1996, Division E, National Defense Authorization Act for FY96. (P.L. 104-106, 10 February 1996). Retrieved 2 August 2003 from the World Wide Web:  
[http://www.gsa.gov/attachments/GSA\\_PUBLICATIONS/extpub/Clinger\\_CohenAct1996\\_4.doc](http://www.gsa.gov/attachments/GSA_PUBLICATIONS/extpub/Clinger_CohenAct1996_4.doc)

Creswell, J. (2003). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Thousand Oaks, CA: Sage Publications.

Defense Information Systems Agency (DISA). Global Information Grid (GIG) Information Services. Retrieved 26 July 2003 from the World Wide Web:  
<http://www.disa.mil/main/ges.html>

Department of Defense (DOD). (1996) Joint Technical Architecture Version 1.0. Washington, DC: Government Printing Office.

Department of Defense (DOD). (2003a) The Defense Acquisition System. (Department of Defense Document 5000.1). Retrieved 2 August 2003 from the World Wide Web: <http://dod5000.dau.mil/>

Department of Defense (DOD). (2003b) Operation of the Defense Acquisition System. (Department of Defense Document 5000.2). Retrieved 2 August 2003 from the World Wide Web: <http://dod5000.dau.mil/>.

General Accounting Office (GAO). (1991). Using Structured Interview Techniques. (GAO Publication No. GAO/PEMD 10.1.5). Retrieved 2 August 2003 from the World Wide Web: <http://www.gao.gov/special.pubs/pe1015.pdf>

Joint Command and Control (JC2) Capability Operational Requirements Document (ORD). Draft for Second Flag Review, 05 May 2003.

Krieger, M. (2003). GIG Enterprise Services and the DOD Net-Centric Data Strategy. Retrieved 27 July 2003 from the World Wide Web: [http://63.249.165.71/8th\\_ICCRTS/Pres/plenary/3\\_1000krieger.pdf](http://63.249.165.71/8th_ICCRTS/Pres/plenary/3_1000krieger.pdf)

Mayo, VADM R. (2002). NETWARCOM Established. CHIPS Magazine Online. Retrieved 20 July 2003 from the World Wide Web: [http://www.chips.navy.mil/archives/02\\_fall/index2\\_files/netwarcom\\_establishment.htm](http://www.chips.navy.mil/archives/02_fall/index2_files/netwarcom_establishment.htm).

Mayo, VADM R. (2003). Delivering FORCEnet. Retrieved 27 July, 2003 from the World Wide Web: [http://www.microsoft.com/usa/presentations/Mayo\\_Navy-MarineCorpsSymposium\\_0422.ppt](http://www.microsoft.com/usa/presentations/Mayo_Navy-MarineCorpsSymposium_0422.ppt)

Mayo, VADM R., Nathman, VADM J. (2003). FORCEnet: Turning Information into Power. United States Naval Institute Proceedings Online. Retrieved 27 July, 2003 from the World Wide Web: <http://www.usni.org/proceedings/Articles03/PROmayo02.htm>

Navy Command and Control Systems (NCCS). (1998). GCCS-M FY98 Spend Plan.

Navy Command and Control Systems (NCCS). (2001). GCCS-M Milestone IIIA Review.

Operational Test and Evaluation Force (OPTEVFOR). (2001). Operational Evaluation (OPEVAL) of GCCS-M.

Randall, S. (2003). SPAWAR Organizational Update. National Defense Industry Association San Diego Chapter. Retrieved 20 July 2003 from the World Wide Web: [http://www.ndia-sd.org/smallbus/docs/Scott\\_Randall-8APR2003.ppt](http://www.ndia-sd.org/smallbus/docs/Scott_Randall-8APR2003.ppt)

Secretary of the Navy (SECNAV). (1995) Department of the Navy Research, Development and Acquisition, and Associated Life Cycle Management Responsibilities.

(SECNAV Instruction 5400.15A). Retrieved 2 August 2003 from the World Wide Web:  
<http://neds.nebt.daps.mil/Directives/5400a15.pdf>

Space and Naval Warfare Systems Command (SPAWAR SYSCOM). (1993). Integrated Program Summary for Operations Support System (OSS).

Space and Naval Warfare Systems Command (SPAWAR SYSCOM). (1996).  
Designation of the Joint Maritime Command Information System, Operations Support System, and Ocean Surveillance Information System Baseline Upgrade as Major Automated Information Systems.

Space and Naval Warfare Systems Command (SPAWAR SYSCOM). (1998).  
Acquisition Decision Memorandum, Navy Command and Control Systems Program, Joint Maritime Command Information System (JMCIS) Milestone IID Review Meeting.

Tuckman, B. (1965). Developmental Sequence in Small Groups. Psychological Bulletin, 63, 384-399.

Valenzuela, D., & Shrivastava, P. Interview as a Method for Qualitative Research. Arizona State University. Retrieved 7 July 2003 from the World Wide Web:  
<http://www.public.asu.edu/~kroel/www500/Interview%20Fri.pdf>

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center  
Ft. Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California
3. Prof. Walter Owen  
Naval Postgraduate School  
Monterey, California
4. CAPT Will Rodriguez  
Navy Command and Control Systems  
PEO C4I & SPACE, PMW 157  
San Diego, California
5. Mr. Bryan Scurry  
Navy Command and Control Systems  
PEO C4I & SPACE, PMW 157  
San Diego, California
6. Mr. Steven G. Bullard  
Navy Command and Control Systems  
PEO C4I & SPACE, PMW 157  
San Diego, California